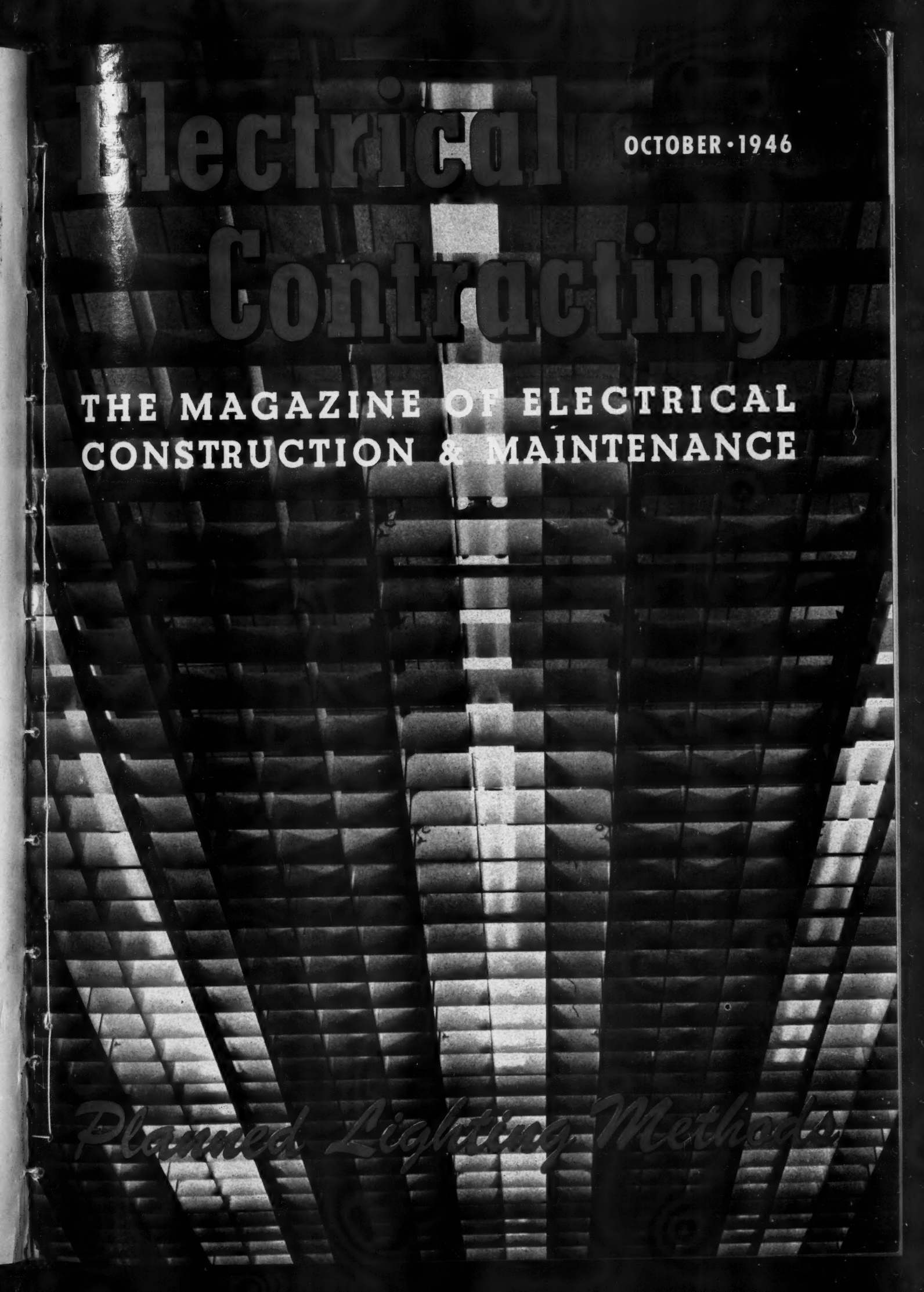
Electrical Contracting

OCTOBER · 1946

THE MAGAZINE OF ELECTRICAL CONSTRUCTION & MAINTENANCE



Planned Lighting Methods

LET G-E PYRANOL CAPACITORS Boost Your Electrification Gains

"Saved $2,000 in the first 4 months!" reports one mine operator after he had installed G-E pole-type Pyranol capacitors at a cost of $5,000.

Assure Top Performance, Reduced Power Costs, Through High Power Factor

The economies obtained by increased electrification of industry can be seriously affected by a low power factor and the resulting high power costs. This needn't happen in your case—if you take advantage of the savings made possible by proper capacitor utilization. If you buy power and your contract contains a power-factor adjustment or kva-demand clause, capacitors can reduce your power costs by giving you more "working" power for every dollar you spend.

If you operate your own power plant, capacitors enable your generators to deliver more "payload" kilowatts—up to their maximum rating. In either case, they improve your voltage, reduce power losses, and help prevent system overloading. Very often, too, a capacitor installation permits the addition of more motors or other electrical equipment to a "fully loaded" system without the expense of additional feeders, transformers, or generators.

Users tell us that G-E capacitors return from 57 per cent to 120 per cent of their original cost every year. In other words, they pay for themselves many times over. Reliability of operation, of course, is essential before you can realize any worthwhile savings and G-E Pyranol capacitors are noted for the care and precision used in their manufacture. They're non-inflammable, hence less expensive to install. They are smaller than other types, require less space, and they have stable operating characteristics that assure long life.

Applying capacitors to secure maximum savings requires a study of your existing and anticipated circuits and power demands. General Electric engineers, because of their wide experience in this field, are able to render this service. Why not consult with the G-E office nearest you? *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

ENCLOSED CAPACITOR UNITS for single motors or small loads. Ratings from 0.5 to 7.5 kvar, 230 volts; 1 to 15 kvar, 460 and 575 volts for 1-, 2-, or 3-phase.

SMALL INDOOR EQUIPMENTS occupy little space. Available in 1-, 2-, or 3-phase ratings up to 90 kvar at 230 volts; 180 kvar at 460, 575, 2400, 4160, 4800 and 7200 volts.

LARGE INDOOR EQUIPMENTS—Large capacity in a single block. Ratings up to 630 kvar, 230 volts; 1260 kvar, 460 and 575 volts; and 2520 kvar, 2400 to 13,800 volts. With or without breakers.

POLE-TYPE OUTDOOR EQUIPMENTS—Completely weatherproof, all-welded steel housing. Pole or base mounting. For primary circuits, 2400, 4160, 4800, and 7200 volts. Ratings up to 180 kvar, 1-, 2-, or 3-phase.

LARGE OUTDOOR EQUIPMENTS—Large capacity in a single block. Weatherproof. With or without circuit breakers. Available in same voltage, kvar, and phase ratings as large indoor equipments.

GENERAL ELECTRIC

407-107-5700

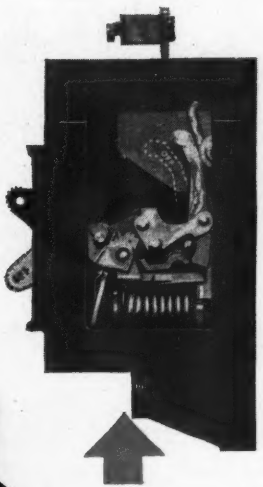
IMPORTANT ANNOUNCEMENT

NOW *in production*—Murray

MAGNETIC

CIRCUIT BREAKERS

IN NEW APPLICATIONS



THESE much-wanted, new applications are shown below. The heart of each is the Murray MAGNETIC Circuit Breaker—magnetic, because, by means of magnetism alone and without thermal action of any kind, it provides absolutely instantaneous shut-off of current in the event of a short circuit and delayed interruption in the case of overloads. These compact, underwriter-approved Murray Magnetic Circuit Breakers are ready for shipment NOW. Write or 'phone your nearest jobber for all the facts, or ask us direct. Metropolitan Device Corpporation, Brooklyn 16, New York.

ABOVE

The use of a magnetic tripping mechanism and an efficient magnetic blow-out provides an instantaneous circuit interruption in the event of a short circuit. A precision time-delay device accommodates the brief overloads normally encountered, such as motor-starting currents or the high initial current flow through tungsten lamps. The characteristics of the Murray Magnetic Circuit Breaker are not affected by above-normal temperatures ordinarily found in service equipment.

ABOVE

Outdoor, weather-proof, deep-drawn service equipment, supplied with one or two circuit breakers. Has a 1¼" formed hub in top end-wall.

CENTER

Outdoor combination socket-meter and load center, equipped with two circuit breakers and bussing necessary for addition of four breakers. Rust-resisting metal, aluminum finish.

RIGHT

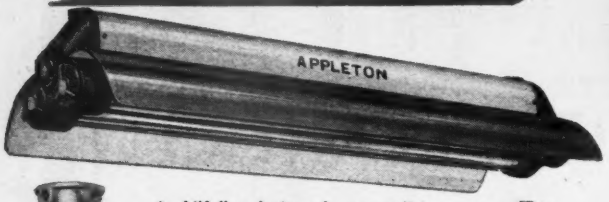
Load centers, supplied with two or more circuit breakers. Are equipped with busses and connectors for a total of six circuit breakers. Indoor-flush and surface types — with baked-on aluminum finish.

METROPOLITAN DEVICE CORPORATION
BROOKLYN 16, NEW YORK

Better Light... Safer Light

FOR HAZARDOUS LOCATIONS with APPLETON Lighting Equipment

EXPLOSION-PROOF...

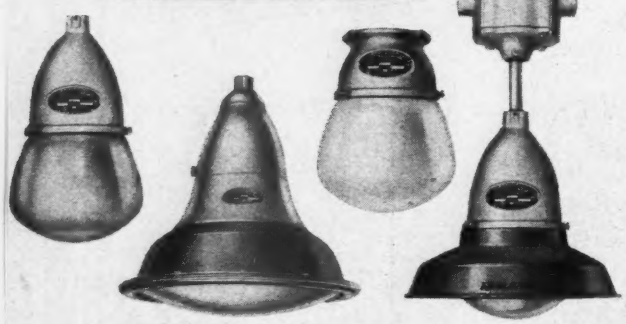


A skilfully designed, ruggedly built Explosion-Proof Fixture for every need—including the new, exclusive Fluorescent type, first of its kind in America. (Patented January 1, 1946; Patent No. 2,392,202.) Two sizes, taking two 40-watt, 48-inch lamps; or two 100-watt, 60-inch lamps.

VAPOR-TIGHT...

Twenty-four different Vaportight types in a range of sizes and options to meet every requirement. Literally thousands of combinations are readily available.

DUST-TIGHT...



Ceiling, bracket and pendent types for use with or without guards and reflectors, all with threaded dust-tight seal. Streamlined to prevent dust accumulation.

FOR SAFETY • EFFICIENCY • PERMANENCE

Sure-footed engineering skill . . . product of years of research in Appleton plants and in the field . . . marks the design of all Appleton Lighting Equipment.

Typical is the way in which Appleton engineers ingeniously overcame obvious problems in designing the Explosion-Proof Fluorescent Fixture. Still exclusive with Appleton, it brought the advantages of modern lighting to Class I, Groups C and D; and Class II, Groups E, F and G locations.

Appleton Explosion-Proof, Vaportight and Dust-Tight Lighting Fixtures all offer a wide margin of safety, meeting fully the requirements of every hazardous location. *All* are Underwriters' Laboratories approved, all are ruggedly built of tough, malleable iron to outlast any building.

Send Today... The *complete* Appleton line of over 15,000 items . . . a fitting or fixture exactly suited to every need . . . is fully described in the big Appleton Catalog, gladly sent on request to any user of electrical wiring material.

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APPLETON

CONDUIT FITTINGS • OUTLET AND SWITCH BOXES • EXPLOSION-PROOF FITTINGS • REELITES

A practical technical and management journal for electrical contractors, industrial electricians, inspectors, engineers and motor shops, covering engineering, installation, repairing, maintenance and management, in the field of electrical construction and maintenance.

Electrical Contracting

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"Everybody ~~wants~~ needs to get into the act . . ."

Yes—CERTIFIED STARTERS give the kind of *superlative performance* that inspires manufacturers, sellers and users of fluorescent lighting equipment to applaud... and come back for more!

The reasons are simple: CERTIFIED STARTERS are made by 10 leading manufacturers to *exacting specifications* set up by lighting experts . . . to assure dependable operation and service. CERTIFIED STARTERS are tested, checked and CERTIFIED as to compliance with these specifications by impartial experts, Electrical Testing Laboratories, Inc. That means all-around protection!

You'll always get longer lamp life—better lighting service from fixtures—with CERTIFIED STARTERS. Look for the ETL mark!

CERTIFIED STARTERS *are specified equipment of FLEUR-O-LIER and RLM fluorescent lighting fixtures.*

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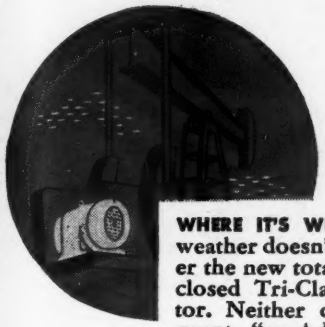
FOR TODAY'S TOUGHER JOBS, HERE'S A NEW TOUGHER MOTOR



WHERE IT'S WET Wet weather doesn't bother the new totally-enclosed Tri-Clad motor. Neither do frequent "washdowns" in food plants.

WHERE IT'S CORROSIVE Acids, alkalis, and fumes are kept out of these new Tri-Clads. Cast-iron enclosures are corrosion-resistant, extra strong.

WHERE IT'S DIRTY Dirt and dust can't get into these Tri-Clads to shorten their life. Smooth surfaces are convenient to clean.

WHERE IRON DUST FLIES Harmful iron dust and metal filings can't get past the inner wall. Bearings are protected from dust.

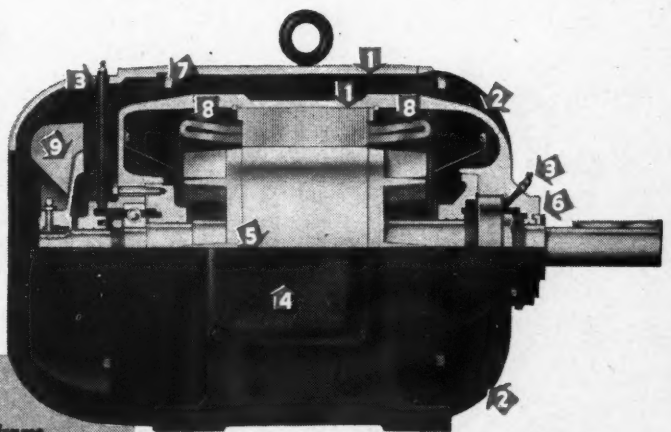
WHERE QUARTERS ARE CLOSE When space is limited for a totally enclosed motor, you'll like these trim, compact new Tri-Clads.

WHERE EXPLOSION HAZARDS EXIST The new Tri-Clad motors are available in explosion-proof constructions where needed.

THE G-E *TRI-CLAD* TOTALLY ENCLOSED MOTOR

(1 TO 1000 HP)

In 1940 you welcomed the Tri-Clad open motor with it's *extra protection features*. More Tri-Clads have since gone into service than any other integral-horsepower motor. Now G.E. is ready with a new line of tough, totally enclosed Tri-Clad motors for use in adverse atmospheres. *We believe they are industry's most dependable motors*. Their longer life and lower maintenance will make them a sound investment on almost every job. Apparatus Dept., General Electric Co., Schenectady 5, N. Y.



10-POINT PROTECTION

1. A cast-iron, double-wall frame completely encloses and protects the windings and punchings.
2. Corrosion-resistant cast-iron end shields are machined to provide a tight seal, and protect the motor from dust, dirt, and moisture. Primer and finish coat of Glyptal* varnish affords high rust-resistance.
3. A pressure-relief greasing system, which can be packed with long-life lubricant, protects the bearings.
4. The cast-iron conduit box is diagonally split for easy wiring. Boxes are independently explosion-proof on Class I motors.
5. Nonshrinking compound around motor leads protects motor interiors from dust and moisture at the point where leads pass through the frame.
6. Rotating labyrinth seal further protects motor interior from damage by foreign matter.
7. Large air passages provide adequate protection from overheating. They're easy to keep clean and open, too.
8. Modern, "ageless" insulation treatment includes windings of *Formex magnet wire.
9. The powerful external fan is removable to simplify maintenance; nonsparking type in explosion-proof motors.
10. Individual dynamic balance of rotors and external fans protects against vibration hazards, even under severe operating conditions.

*Trade-mark Reg. U. S. Pat. Off.

FOR THE COMPLETE STORY

Apparatus Department, Section 750-278C
General Electric Company
Schenectady 5, N. Y.

☐ Please send me GEA-4400, which describes the new Tri-Clad totally enclosed motors.

☐ Please send me GEA-4131, "Motors and Control for Hazardous Locations."

NAME.....

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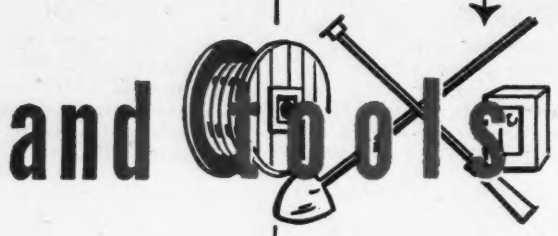
ADDRESS.....

8080

GENERAL ELECTRIC

our business...

moving men



and tools

for YOU!

● To assist you in maintaining communications, power, light and gas, we design and build truck bodies on an assembly line basis—that's the business of The American Coach & Body Co.

Your needs require several different types of bodies for specific jobs . . . line construction, light line service, general service and meter installation, utility, crew compartment, maintenance, installation, tree trimming and others. We make them all.

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We serve you with what you need to help you serve others.

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THE *Famous*

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FEATURES OF THE T-44

Long, accurate service with minimum maintenance is assured by the use of the Telechron motor.

The simple construction—the small number of parts—reduce service calls that eat into profits.

A sturdy, weatherproof case permits either indoor or outdoor installations and eliminates damage in normal handling.

Easily accessible terminals allow the switch to be installed with a minimum of time and effort.

For more information, check your regular supply house or write to Apparatus Department, General Electric Company, Schenectady 5, N. Y.

USE THIS TIME SWITCH FOR

- **Protective lighting of outdoor areas**
- **Show- and store-window lighting**
- **Electric signs, billboards, and spectaculars**
- **Street lighting**
- **Airport lighting**
- **Traffic control, alarm, and signal systems**
- **Poultry house lighting**
- **Domestic furnaces and water heaters**

GENERAL ELECTRIC

The Case of the INQUIRING LIGHTING SALES MANAGER

Chapter One: HE ASKS FLEUR-O-LIER SOME POINTED QUESTIONS

what are certified FLEUR-O-LIERS?

FLEUR-O-LIERS are fluorescent lighting fixtures made to exacting specifications, set up by lighting experts, for performance, construction and service.

what do you mean, "CERTIFIED"?

Fixtures built to the FLEUR-O-LIER specifications are submitted for testing and checking to independent experts, Electrical Testing Laboratories, Inc. If the fixtures meet all rigid specifications, they are permitted to bear the ETL CERTIFICATION LABEL, shown below.

Is FLEUR-O-LIER the brand name of <u>one</u> company?

Not at all! 27 leading fixture manufacturers participate in the FLEUR-O-LIER CERTIFICATION program at the present time, and the number is growing.

this label is your clue to good lighting fixtures!

It is your definite assurance of *electrical, mechanical and lighting excellence* in fluorescent lighting fixtures!

FLEUR·O·LIER *Manufacturers*

Fleur-O-Lier is not the name of an individual manufacturer, but of a group of more than 30 leading fixture manufacturers. Participation in the FLEUR-O-LIER MANUFACTURERS' program is open to any manufacturer who complies with FLEUR-O-LIER requirements.

Portrait of a MAINTENANCE MAN

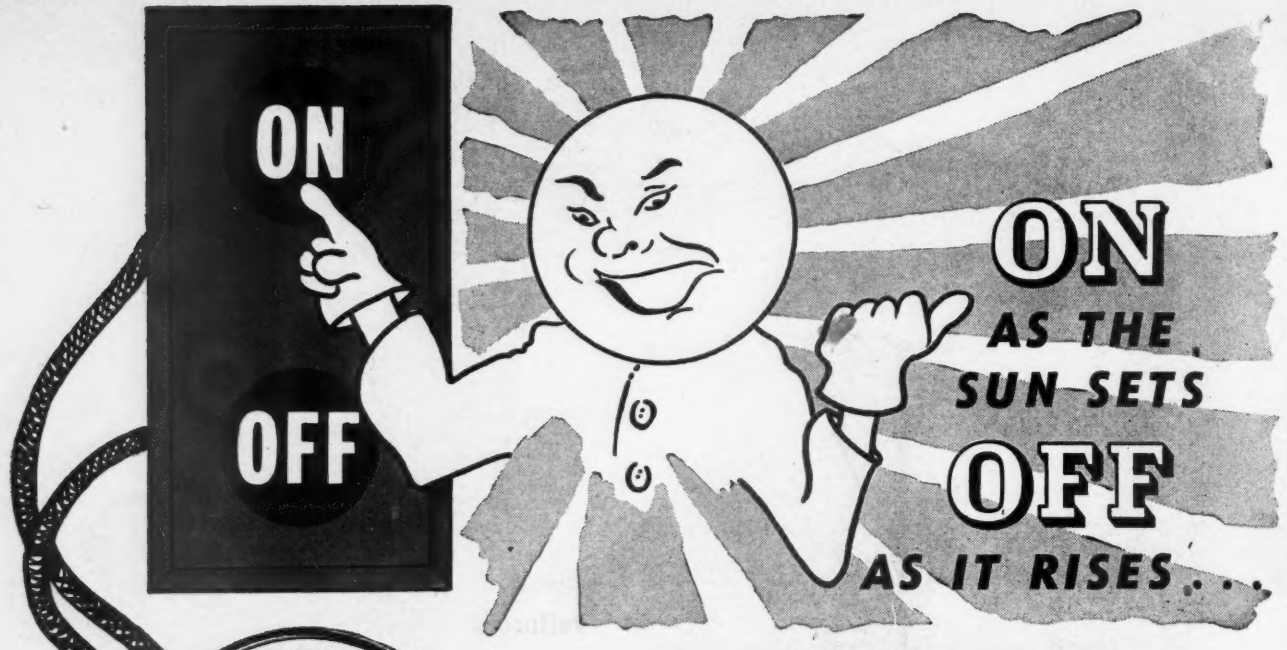
A little exaggerated; perhaps . . . but what we're trying to say is simply this: FEDERAL NOARK Products are built to provide dependable performance wherever they're installed. Their many exclusive features of design and construction mean a minimum of supervision... and a real saving in maintenance costs. It's good sense—and good business to specify FEDERAL NOARK Electric Products! . . . Federal Electric Products Company. Executive Offices: 50 Paris Street, Newark 5, N. J. Plants: Hartford, Conn., Newark, N. J., St. Louis, Mo., L. I. City, N. Y.

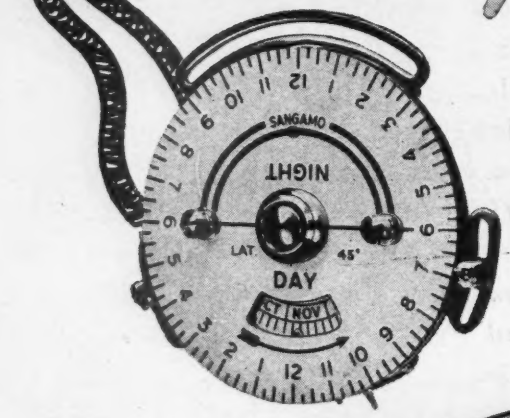
Portrait of FEDERAL NOARK Magnetic Starter, Bulletin 404 in action

Federal NOARK

INDUSTRIAL CONTROLS

Federal Electric Products Company, manufacturers of a complete line of electrical products including: Motor Controls, Safety Switches, Circuit Breakers, Service Equipment, Panelboards and Switchboards





SANGAMO

Astronomic Dials

AUTOMATIC IN OPERATION

The problem of coping with the natural phenomenon which changes the length of day and night, and how this affects the operation of commercial lighting, is solved by the automatic operation of Sangamo Astronomic Dial Time-Switches. This type of time-switch changes its settings daily because the astronomic "on" and "off" arms follow the rising and setting times of the sun. Astronomic dial switches are particularly practical for the automatic control of outdoor advertising, flood-lights, air beacons, light houses, yard lighting, and other applications where periodic resetting of the regular dial is required. While production of Sangamo Time-Switches is now at higher than pre-war rate, the present large backlog suggests placing early your orders for future delivery.

FORM KAZ

In addition to the astronomic "on" and "off" operation, this switch permits the "off" operation at any time between 9:30 P.M. and 2:15 A.M. If desired the time-switch can be operated manually without affecting subsequent automatic operations. It is available in a wide variety of combinations providing two-circuits, duplex, and outdoor switches; also with Sunday and holiday omitting device, as well as advance time cutoff.

Both of the Sangamo Time Switches shown here are equipped with Astronomic Dials.

FORM VSWZ

Equipped with astronomic dial, Form VSWZ also provides for continuous operation during power interruptions through its electrically wound movement — although it is normally synchronous motor operated This "carryover" feature is entirely automatic, eliminating the necessity of resetting the dial after power interruptions up to ten hours, thus insuring dependable and accurate timing under all conditions.

WRITE NOW FOR CIRCULAR NO. 205

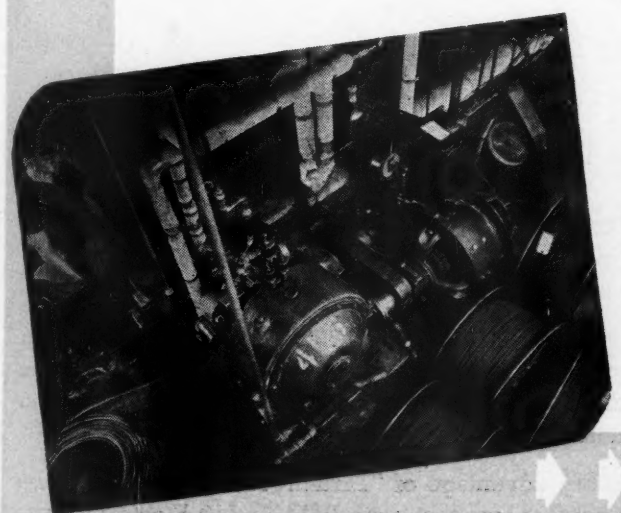
It contains compact and concise information on the wide variety of control features available in various forms of Sangamo Time-Switches, including outdoor types.

SANGAMO ELECTRIC COMPANY SPRINGFIELD ILLINOIS

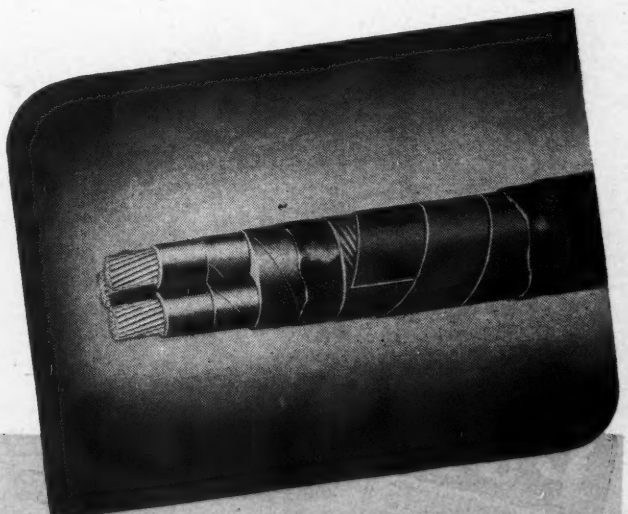
How these tests at Wilkes-Barre PAY OFF FOR YOU AND YOUR CUSTOMERS

LONG, TROUBLE-FREE LIFE with your insulated wires and cables starts with the type of raw materials that go into their manufacture. So Hazard checks and tests rubber, synthetics and plastics, cotton, metals, jute. Every item received must first pass thorough laboratory tests for electrical characteristics, aging qualities, uniformity, mechanical strength, etc., before release to the production department.

Tests... tests . . . and more tests! Hazard checks raw materials . . . manufacturing operations . . . every finished product — all to eliminate the possibility of dangerous and costly wire and cable failure in actual service. Come war, come peace, come shortages or abundances of materials — you can select Hazard insulated wires and cables with complete confidence always. *For example, in all the millions of feet of Hazard Armortite Underground cable (illustrated below) installed since 1928, when it was introduced, not a single failure due to inherent defects of insulation has been reported.* Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.



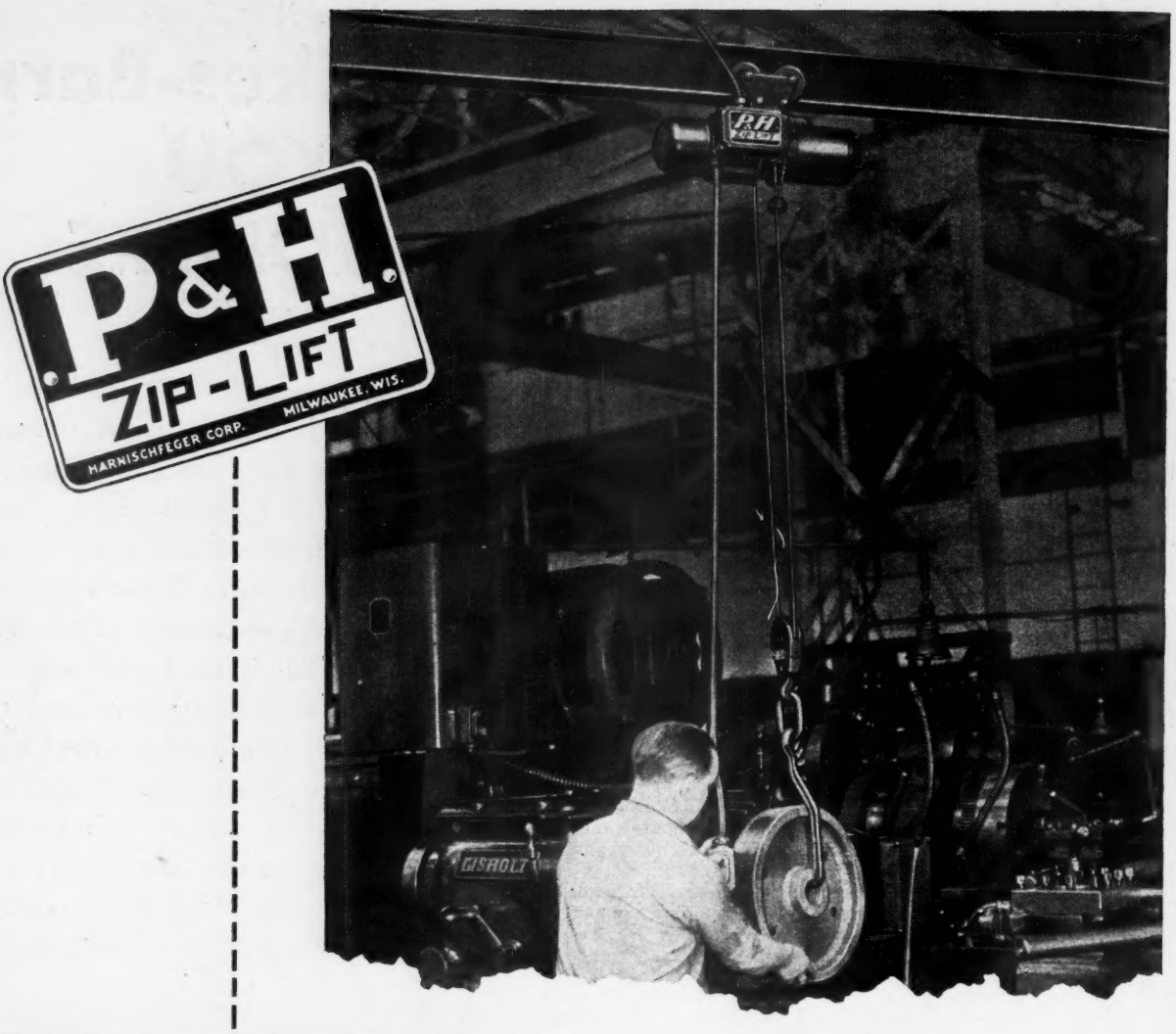
CABLE UNIFORMITY AND STABILITY are rigidly controlled through every critical step in manufacture by sensitive gauges and instruments that control temperature, pressure, dimensions . . . that continuously measure electrical strength of the insulation and stop machinery instantly if the slightest change develops.



A TRIPLE-CHECK IS YOUR PERFORMANCE INSURANCE. In addition to all the tests and checks made of raw materials and production operations, every inch of every Hazard wire or cable when completed, must stand up under an electrical pressure test far above what ever could normally be expected in service.

HAZARD

insulated wires and cables for every electrical use



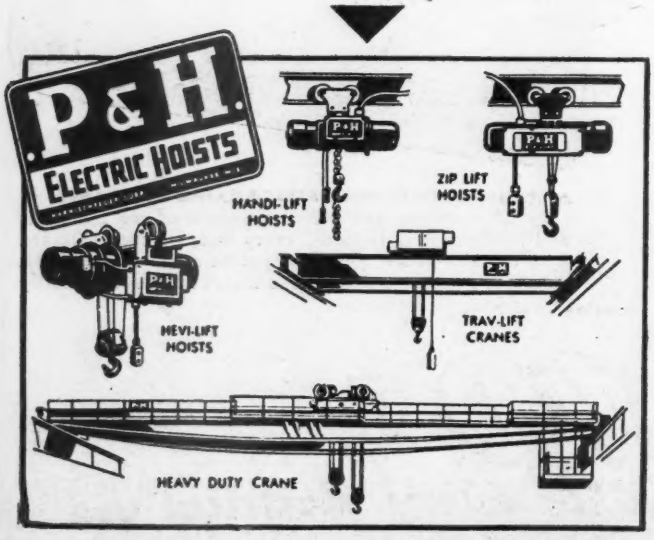
EASY DOES IT- EVERY TIME

when your loads move "THRU-THE-AIR"

Look at this fellow. He doesn't waste his time and skill "muscling" jobs into place. He just presses buttons, and "Thru-the-Air" handling does the rest.

Smooth electric power lifts, carries, "spots" each load exactly where it's wanted. Each load moves *direct*—well above congested aisles—requiring no floor space, no costly rehandling.

Every advantage of "Thru-the-Air" handling can be yours, at low cost, with P&H Zip-Lift Electric Hoists. Better yet, you can apply these savings to every plant operation—receiving, processing, shipping, storing. Zip-Lifts are easy to install—on hook, jib, or trolley—ready for action right away. For full details, get Bulletin H20-2.



HARNISCHFEGER
CORPORATION
HOISTS • WELDING ELECTRODES • MOTORS P&H EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

4426 W. National Avenue, Milwaukee 14, Wisconsin

Leader has always worked towards the finest in fluorescent lighting, excellent workmanship, careful design, accurate engineering . . . for New Horizons in fluorescent lighting.

In the latest Leader success, the New Horizon Series, you will find Leader quality throughout; plus new streamlining and simplicity made possible by Slimline Tubes.

The New Horizon Series are trim, compact, streamlined; they lend themselves to modern trends of architecture and especially long in-line continuous run installations.

The New Horizon Series feature the new Slim-line F96T8 tubes and are manufactured for both Industrial and Commercial installations. There is a Leader Representative in your area with complete information on the New Horizon Series.

Distributed only through the better electrical wholesalers.

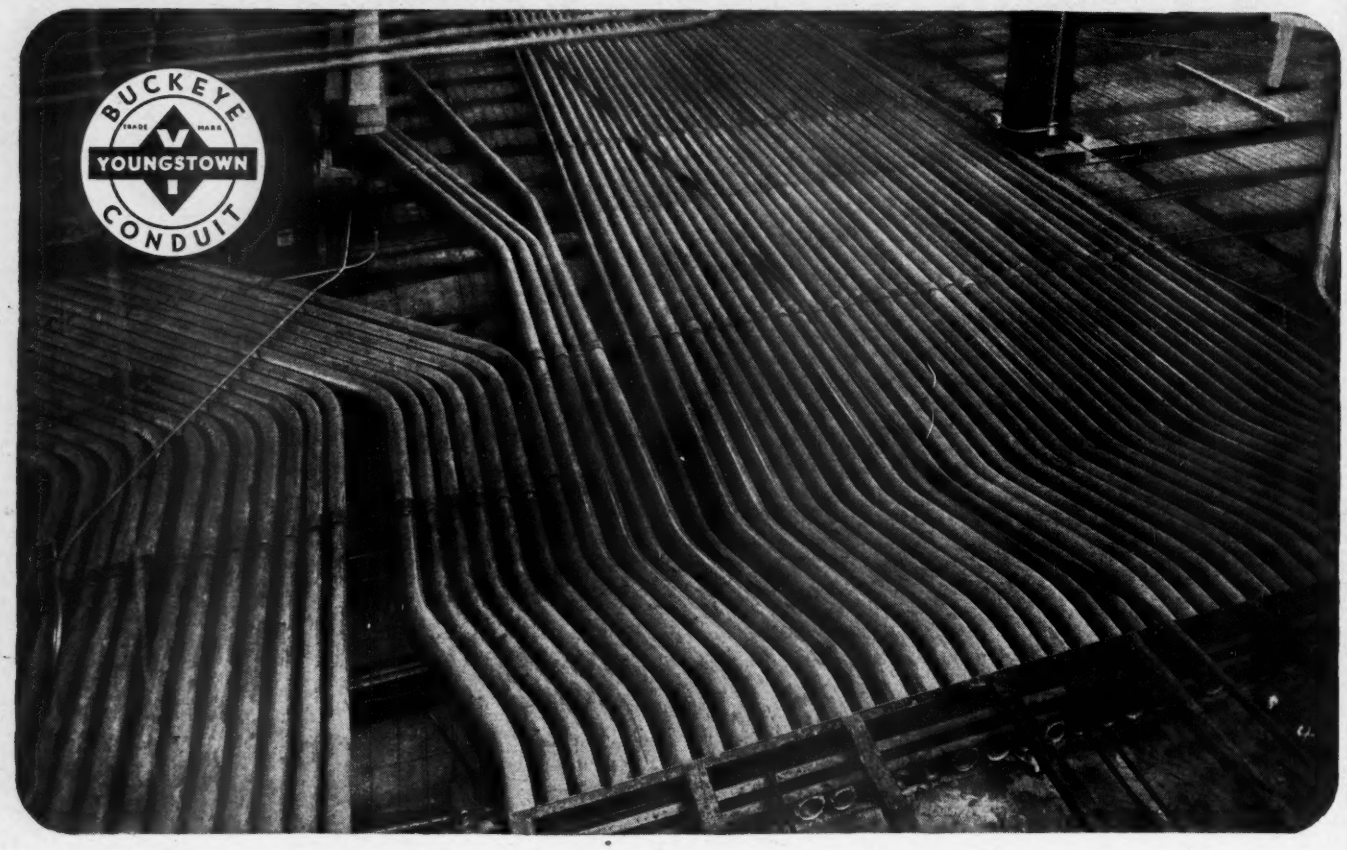
LEADER ELECTRIC MANUFACTURING CORP.

6127 NORTH BROADWAY · CHICAGO 40, ILLINOIS

★

WEST COAST FACTORY · 2040 LIVINGSTON STREET, OAKLAND 6, CALIF.

FOR SAFETY'S SAKE . . . USE CONDUIT *(Full Weight Rigid Steel)*



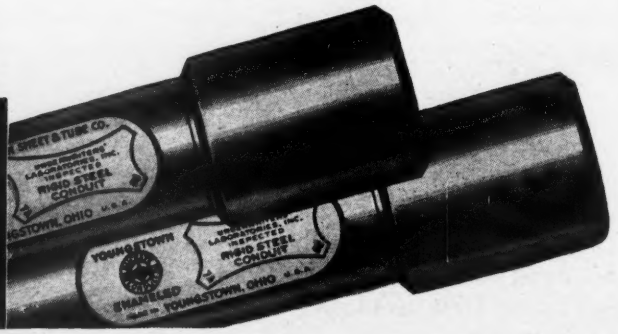
When you say "BUCKEYE CONDUIT"

you're talking Wiring Safety

FOR many years Youngstown "Buckeye" has been the most widely used rigid steel conduit in the world. It is a standard-threaded, heavy wall conduit, properly finished inside and out for maximum wiring protection and efficient installation and service. In every respect it meets the rigid requirements of the industry, as expressed in the National Electrical Code. More than a quarter century of service under the most severe conditions has demonstrated that it is thoroughly dependable.

So specify and install Youngstown "Buckeye" wherever you want positive wiring safety. It is now available through leading distributors in every industrial market. For their names and for other information on conduit, write, phone or wire our nearest District Office.

Ask your distributor for:
Youngstown Buckeye Conduit...Pipe and Tubular Products...Sheets...Plates...Electrolytic Tin Plate...Coke Tin Plate...Bars...Rods...Wire...Tie Plates and Spikes.



YOUNGSTOWN

THE YOUNGSTOWN SHEET AND TUBE COMPANY

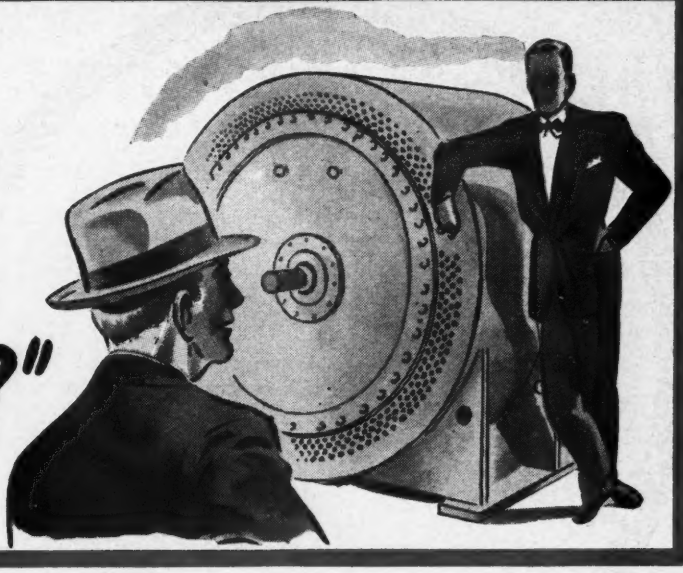
GENERAL OFFICES - YOUNGSTOWN 1, OHIO

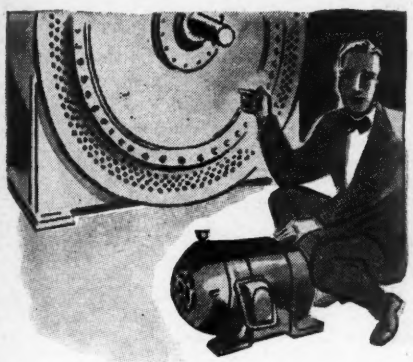
Export Offices - 500 Fifth Avenue, New York City

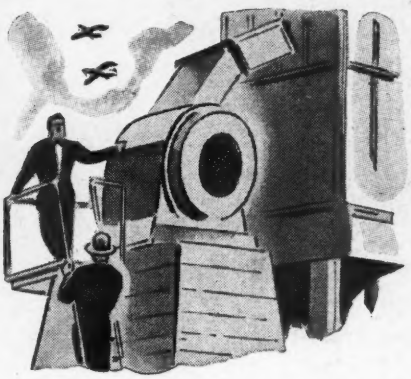
Manufacturers of

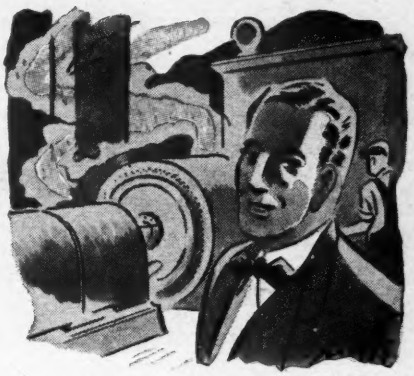
CARBON - ALLOY AND YOLOY STEELS

"Did You Say, Up to 2000 hp ...Weatherproof?"





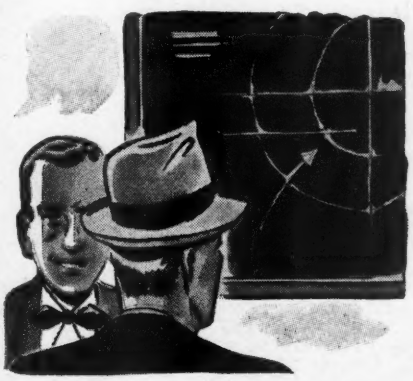




"Right. In Allis-Chalmers' modern motor line we're now prepared to offer you a *complete range* of outdoor weatherproof, totally-enclosed motors all the way from small, standard ratings to sizes of 2,000 hp or larger."

"Why, That Means Then," our customer exclaimed, "in larger ratings they fill the need of power plant engineers who want to install equipment like draft fans *outside*, and thus keep down structure costs per kw capacity." Right again —and they fit into *other* industries too!

Chemical, for instance. Here cast iron motors have generally been preferred ... because they stand up better under acid and alkali conditions. But now these *new* motors, with *new* design improvements, promise to provide several important operating advantages ...

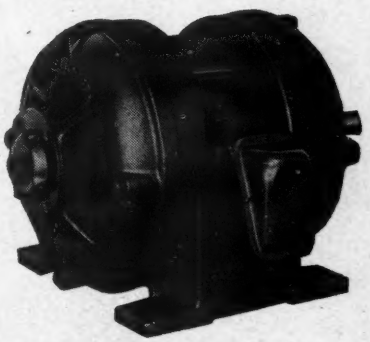


We've Re-designed the heat-transfer system to *improve ventilation.* We've *reduced maintenance* by making air passages not only more accessible, but practically *self*-cleaning as well. And we've *eliminated* liquid and dirt-trapping pockets. In the smaller ratings we of course offer our standard design.

Looking for a Good Motor?

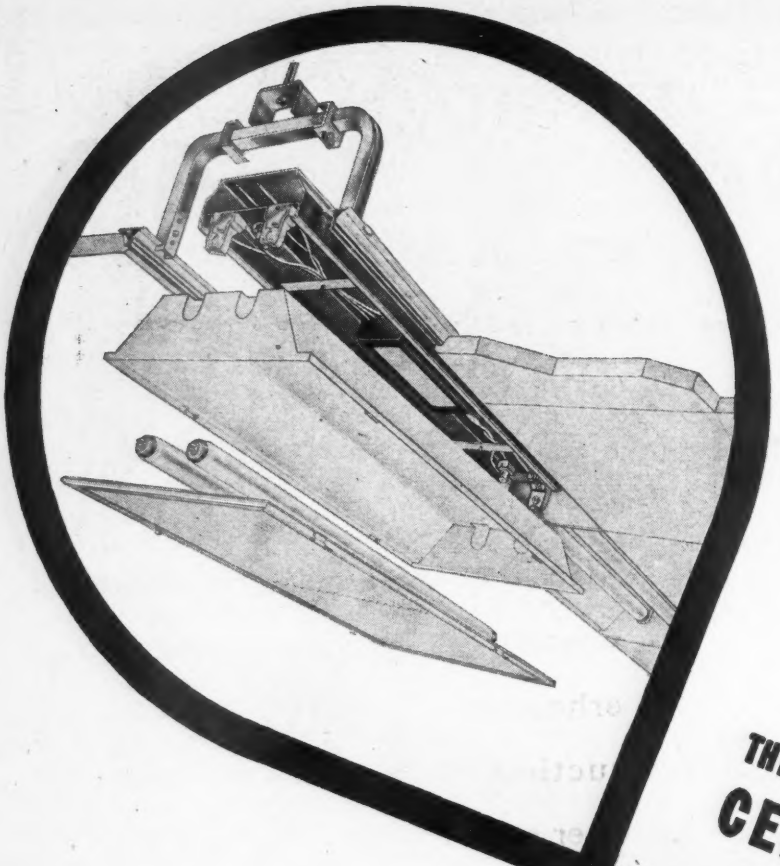
SPECIFY "Allis-Chalmers"! For whether your job calls for a large motor like that above, or a small standard machine, you can be sure of getting two things when you specify "Allis-Chalmers:" 1) Exactly the right type and size motor; 2) consistent with the finest quality workmanship of which we are capable.

For the full story of liberal Allis-Chalmers motor construction, call our nearby dealer or sales office. ALLIS-CHALMERS, MILWAUKEE 1, WIS. A 2117



ALLIS CHALMERS

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products



Installed in a commercial area of any size — the MILLER FLUORESCENT TROFFER LIGHTING SYSTEM gives you (1) perfect light for easy-seeing; and (2) a distinctive, impressive ceiling treatment. Good lighting is made an integral part of the architecture! Furthermore, you get a saving! The continuous wireway channels reduce wiring costs, conduit and conduit fitting costs, from 50% to 80%. The patented Miller Ceiling Furring Hanger improves and simplifies installation. The versatility of application of the Troffer System offers limitless design opportunity — CEILINGS UNLIMITED — while fulfilling its primary purpose — IDEAL LIGHTING.

THE LIGHTING SYSTEM THAT PROVIDES CEILINGS UNLIMITED

MILLER
SINCE 1844

THE MILLER COMPANY • MERIDEN, CONN.

ILLUMINATING DIVISION

ILLUMINATING DIVISION
Fluorescent, Incandescent Mercury Lighting Equipment

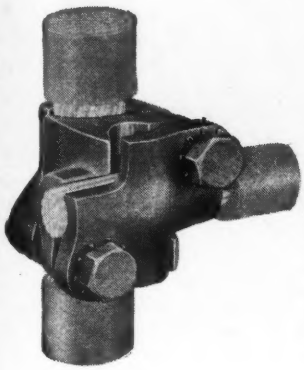
ROLLING MILL DIVISION
Phosphor Bronze and Brass in Sheets, Strips and Rolls

FOUNDRY DIVISION
Non-Ferrous Metal Castings

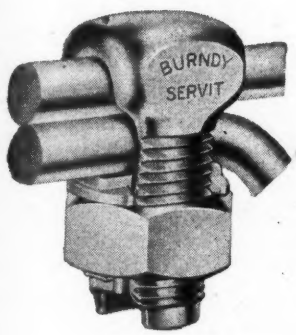
HEATING PRODUCTS DIVISION
Domestic Oil Burners and Liquid Fuel Devices

A Complete Connector Service

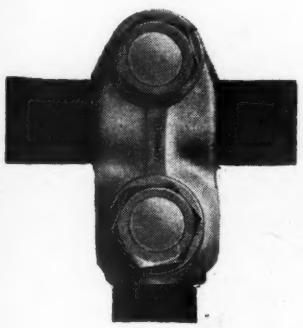
BURNDY



VERSITAP Type QPX— Extremely versatile, for end-to-end, cross, parallel or T connections. High-strength, vibration-proof. Ten sizes for cables #6 to 1000 Mcm.



SERVIT Type KS — Highly popular, used for taps, dead ends, service entrances, motor leads, junction boxes, etc. Thirteen sizes for conductors from #10 wire to 1000 Mcm.

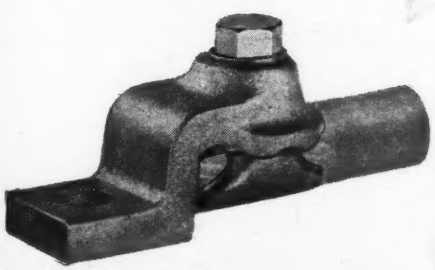


QIKTAP Type QT — A compact T connector. High compression contacts enforced by large bolts and nuts. Withstands severest vibration. Available for all combinations of cables.

SOLDERLESS Electrical Connectors for industrial buildings, power stations or substations; for overhead or underground; construction or maintenance; for copper or aluminum, cable, bar or pipe. Burndy has engineered thousands of electrical connectors. There is one best connector for your next connection and Burndy has it.

Write for Catalog 41 for the proof —

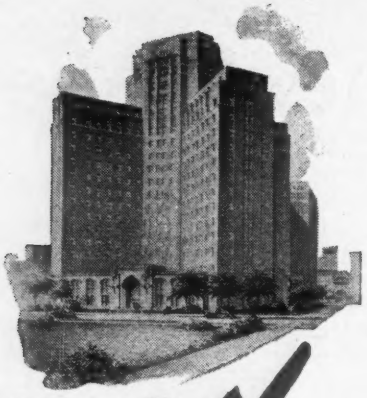
BURNDY NewYork 54, N.Y.



VERSILUG Type EA — Sturdy clamp-type lug with clamp element adjustable to seven angles. Installs with ordinary wrench. Six sizes for conductors from #8 wire to 1000 Mcm. Supplied with 1, 2, or 4 holes in tongue.

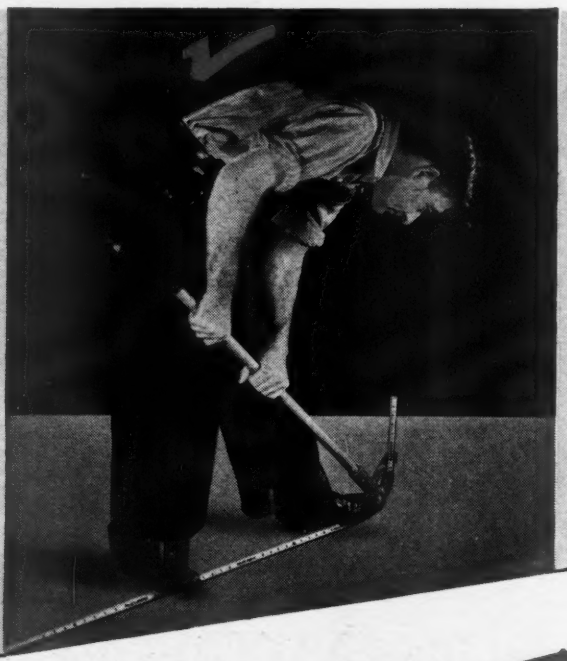
QIKLUG Type QA-B — Withstands high vibrational strain, installs with ordinary wrench. Available with 1, 2, or 4 holes in tongue. Multiple and special types on request. Available for conductors from #14 solid to 500 Mcm.

SCRULUG Type KPA — Low cost, compact, pressure connector having high conductivity. Small size installed with screw driver, large size with ordinary wrench. Available in five sizes for conductors from #14 solid to 500 Mcm.



FOR HOSPITAL WIRING

The Modern Way is



There are three reasons why Republic ELECTRUNITE E. M. T. (Electrical Metallic Tubing) is unequalled for ease of bending and rebending: (1) The uniformly high ductility of the cold-rolled steel used in the ELECTRUNITE manufacturing process. (2) The patented one-piece ELECTRUNITE Bender. (3) the ELECTRUNITE Bending System which simplifies the making of all standard bends, stubs and offsets with predetermined accuracy.

12 Advantages

1. FULL PROTECTION
2. NO THREAD-CUTTING
3. INCH-MARKING
4. LIGHT WEIGHT
5. ✔ EASY TO BEND AND REBEND
6. STANDARD FITTINGS
7. EASY TO INSTALL
8. UNBROKEN CORROSION-RESISTANCE
9. KNURLED INSIDE SURFACE
10. UNIVERSAL ACCEPTANCE
11. LOW COST
12. WIDESPREAD DISTRIBUTION

the Electrunite Way

NO JOB TOO BIG... NONE TOO SMALL...for Safe, Dependable ELECTRUNITE E. M. T. the ORIGINAL Lightweight Steel Raceway

● For safe, dependable wiring protection—ease and convenience of installation—lowest possible original and maintenance costs—no other raceway affords the many advantages of Republic ELECTRUNITE E. M. T.—the *original* streamlined wiring raceway.

Consider these brief facts:

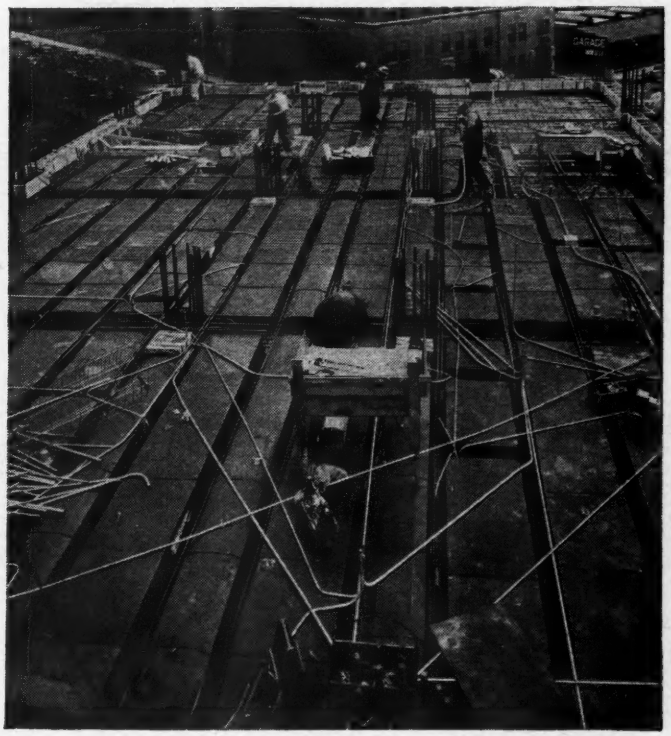
SAFETY—Inspection by Underwriters' Laboratories means positive assurance that ELECTRUNITE E. M. T. provides adequate electrical and mechanical protection throughout the job. Moreover, it is approved by The National Electrical Code for exposed, concealed and concrete slab construction.

EASE OF INSTALLATION—ELECTRUNITE E. M. T. is *threadless* . . . completely eliminates dirty, tedious thread-cutting . . . strong, water-tight joints are made quickly and easily with simple, compression-type couplings and box connectors. And because its weight is less than half that of threaded-type conduit, ELECTRUNITE E. M. T. is easier to bend, easier to handle and easier to install.

LOW COST—Actual installation records from all parts of the country prove conclusively that ELECTRUNITE E.M.T. saves valuable time and money on every type of job.

That's only part of the story. For complete details see your nearest ELECTRUNITE Distributor or write directly to:

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION • CLEVELAND 8, OHIO
Export Department: Chrysler Building, New York 17, New York

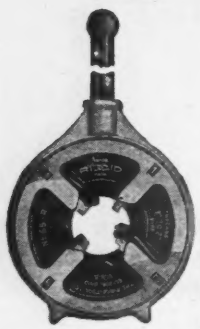


ELECTRUNITE E. M. T. being installed between and over concrete pans in the third floor wing construction of a huge, midwestern hospital. Approximately 500,000 feet of E. M. T. was used in this job.

Republic
ELECTRUNITE E.M.T.
REG. U. S. PAT. OFF.
LIGHTWEIGHT THREADLESS RIGID STEEL RACEWAY

You save time and work when you thread pipe with this RIDGID No. 65R

Tighten on pipe with 1 screw



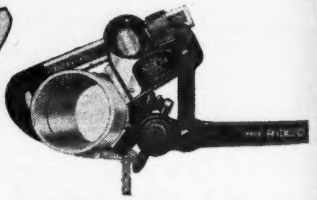
It stands up handily on its own feet.

● Threading 1" to 2" pipe is no chore at all with the self-contained quickly adjusted No. 65R threader. Its high-speed steel chasers set to size in 10 seconds — no loose dies to bother with or lose. Workholder sets to pipe size instantly — no bushings, only one screw to tighten on pipe. And you cut smooth perfect threads with the least possible effort. See for yourself why it's so popular — ask for this time and work saver No. 65R threader at your Supply House.

Only RIDGID guarantees you a repair-free housing . . .

UNCONDITIONAL GUARANTEE
If this Housing ever Breaks or Distorts we will replace it Free
COPR. 1937 THE RIDGE TOOL CO. ELYRIA, O.

SIZES 6" TO 60"



RIDGID *Compound Leverage Wrench.*

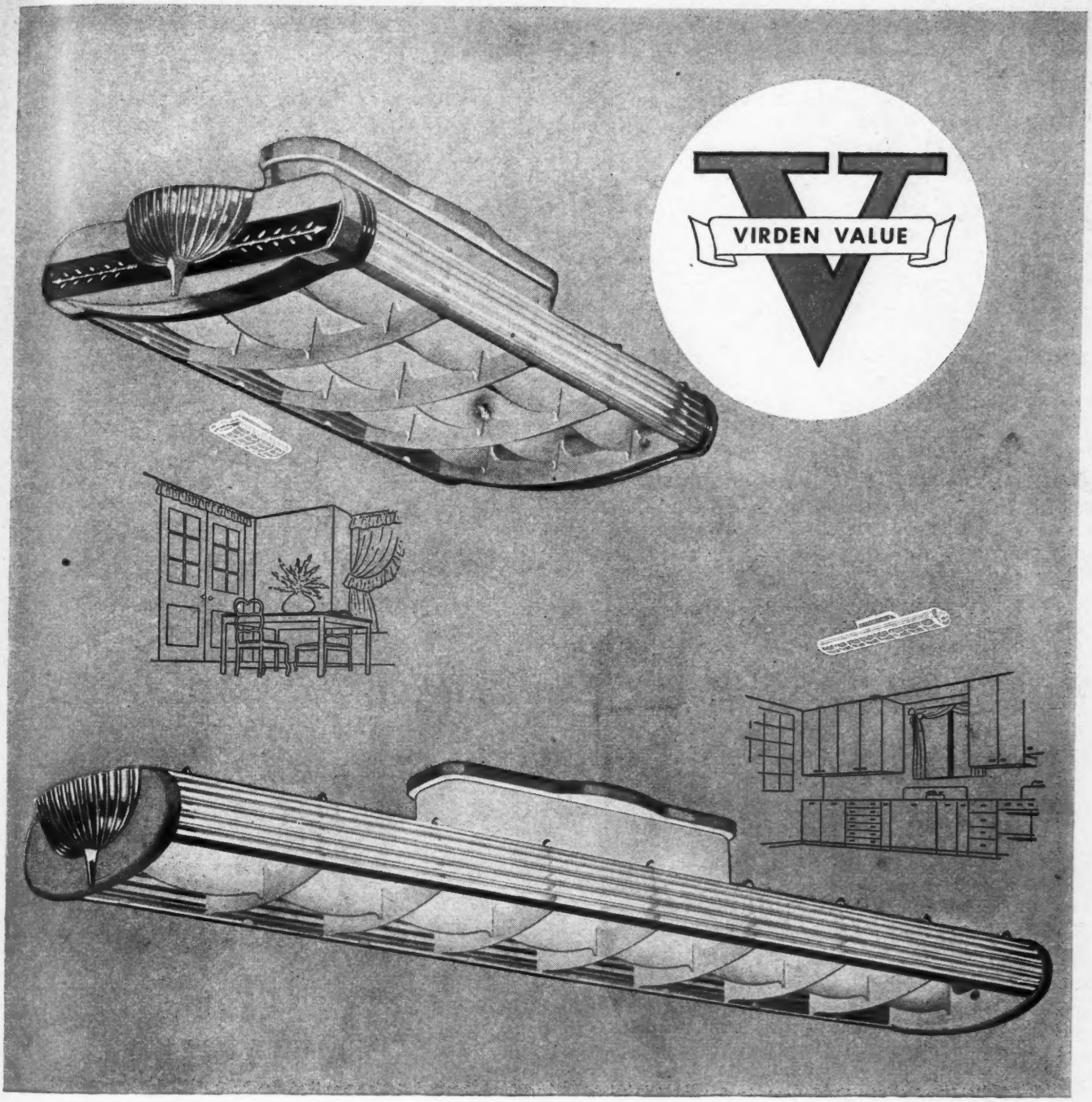
● You get more for your money with RIDGID pipe wrenches. That special design housing simply won't warp or break in any normal use, however strenuous — as millions of users know. No laid up for housing repairs, no bother and expense. No binding of adjusting nut — it spins easily to size. Alloy jaws take hold and let go instantly. Handy pipe scale on hookjaw, comfort-grip I-beam handle. A wrench it's a pleasure to work with — ask your Supply House.

Millions of RIDGID Tools in use

★ RIDGID ★

WORK-SAVER PIPE TOOLS

The Ridge Tool Company
Elyria, Ohio, U. S. A.



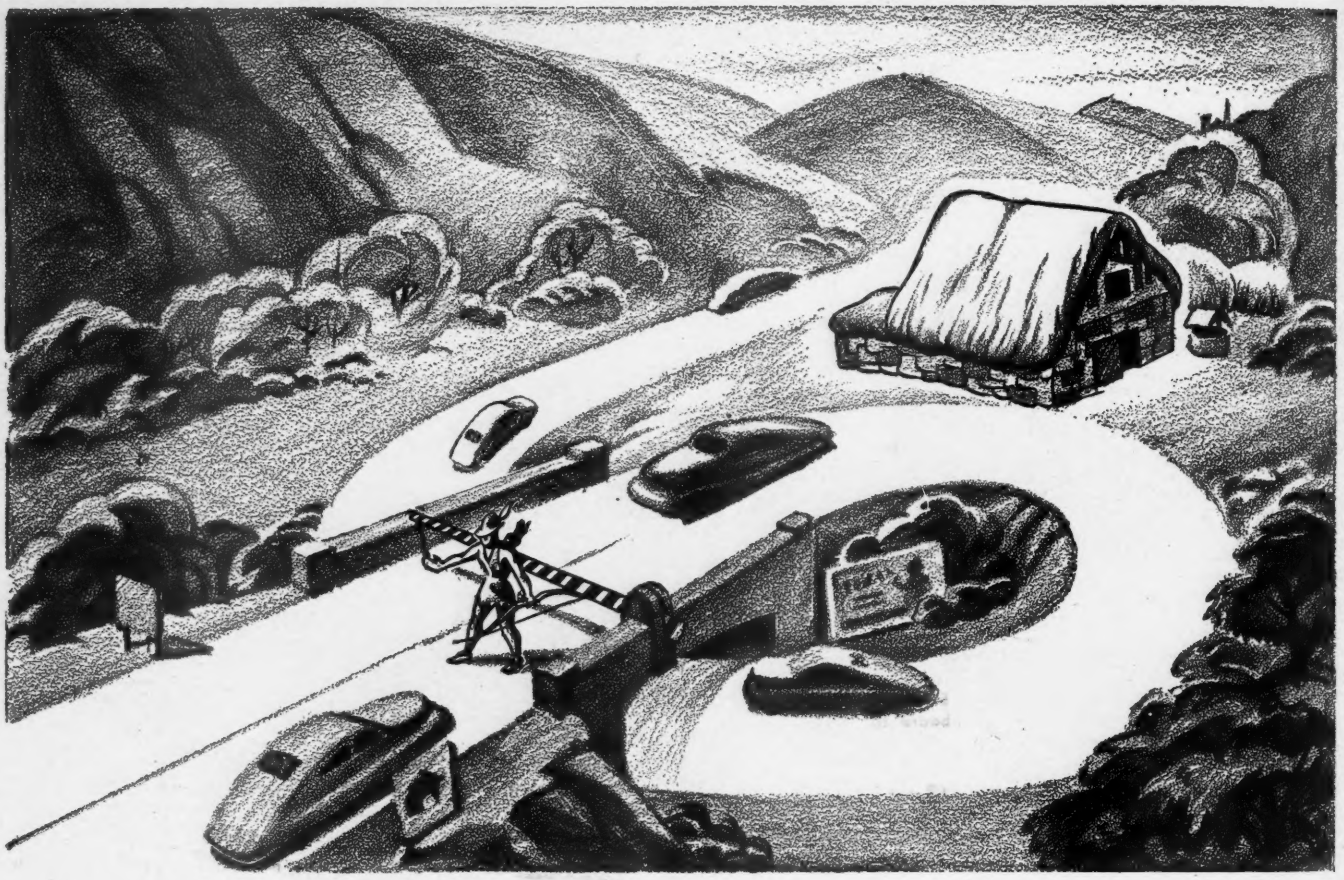
New RESIDENTIAL Fluorescents...ready soon

• At the top a new 4, 20-watt lamp fixture that will be widely used in residential lighting for both kitchen and dining room lighting. A ceiling fixture of the first rank. Utilizes plastics for both decorative and lighting effect. No need to tell you it's rich in beauty and will go over big. It's right in price, performance and personality. • Below is our 2, 40-watt lamp unit for the kitchen. Your customers will like it.

Virden jobbers are always glad to co-operate.

John C. Virden Company • Cleveland, Ohio

Member American Home Lighting Institute



INSTA-START Provides the Straight Road to Wholly Satisfactory Fluorescent Lighting

The separate, mechanical starter for fluorescent lighting is a toll road around Robin Hood's Barn. Compared with the clean logic and simplicity of France INSTA-START any separate starter is something of a Rube Goldberg creation—a technological absurdity like the road in the picture above.

Instant starting of every lamp in the fixture is more than a psychological satisfaction — it is the evidence of efficient, stabilized fluorescent performance. It is also an important factor in lamp life. By combining the starting function with the ballasting function in one unit INSTA-START gives real instant starting and at the same time frees fluorescent lighting of an unnecessary complication with its transient life and often uncertain performance. Maintenance of INSTA-START equipped fixtures is reduced to periodical cleaning and re-lamping.

The production of France INSTA-START is still limited by material shortages and is confined to a few standard types for commercial and industrial fixtures. Other models will be available one of these days and inquiries (to guide your planning) will be welcomed.

FRANCE
INSTA-START
TRADE MARK
The Keystone of Fluorescent Lighting

Write for latest circular and prices on INSTA-START Transformer

THE FRANCE MANUFACTURING COMPANY

Manufacturers of INSTA-START Fluorescent Transformers and Franceformers for Neon Signs

10325 BEREA ROAD • CLEVELAND 2, OHIO

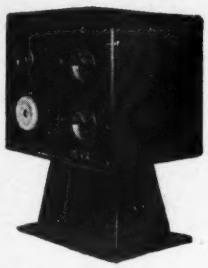
In Canada: Allanson Armature Mfg. Co., Ltd., 21 McCaul St. Toronto 28

EXPERIMENTAL PANEL BOARDS CUSTOM-BUILT BY EXPERIENCE AND SPECIALIZATION...

Wurdack Research Laboratory Equipment meets the exacting specifications for school, college, government & commercial laboratories

Wurdack Laboratory Switching and Control Equipment is designed to facilitate scientific research and experimental work in schools and colleges. Electrical energy is extended from the Main Switchboard to classrooms, tables and laboratories.

Wurdack Service Outlets

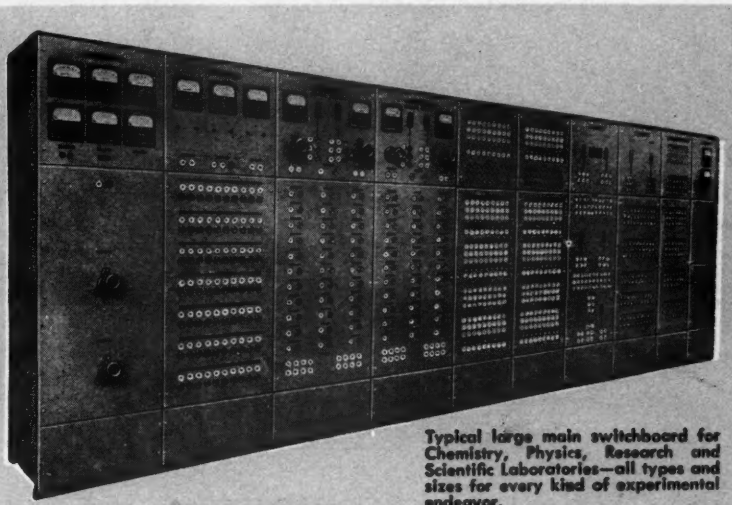


Enclosed service outlets for table or pedestal mounting. Supplied with base to rigidly support outlet and conceal conduits. In various combinations including single and double face.

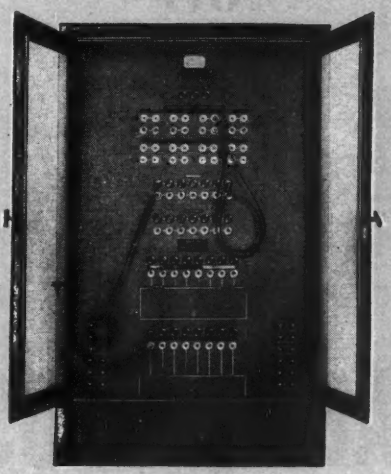
Flush type service outlets in all types of combinations supplied with recess box of code guage steel for mounting flush in work tables, desks or in walls.

Wurdock Cord Sets, color coded, are supplied with male and female plugs—spade lugs or pin plugs.

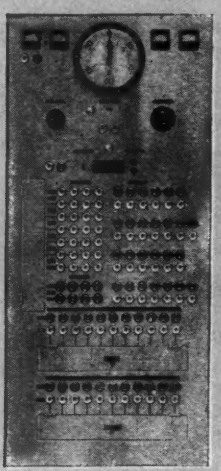
Send for the Wurdack Catalog of Experimental Panelboards



Typical large main switchboard for Chemistry, Physics, Research and Scientific Laboratories—all types and sizes for every kind of experimental endeavor.



Enclosed type of sub-switchboard installed in College Physics Laboratory.



Laboratory Switchboard with Telechron Timer installed in high school.

WM. WURDACK ELECTRIC MFG. CO.

4444 CLAYTON AVENUE SAINT LOUIS 10, MO.

A Division of Federal Electric Products Company

DEPENDABLE FLUSH SWITCHES

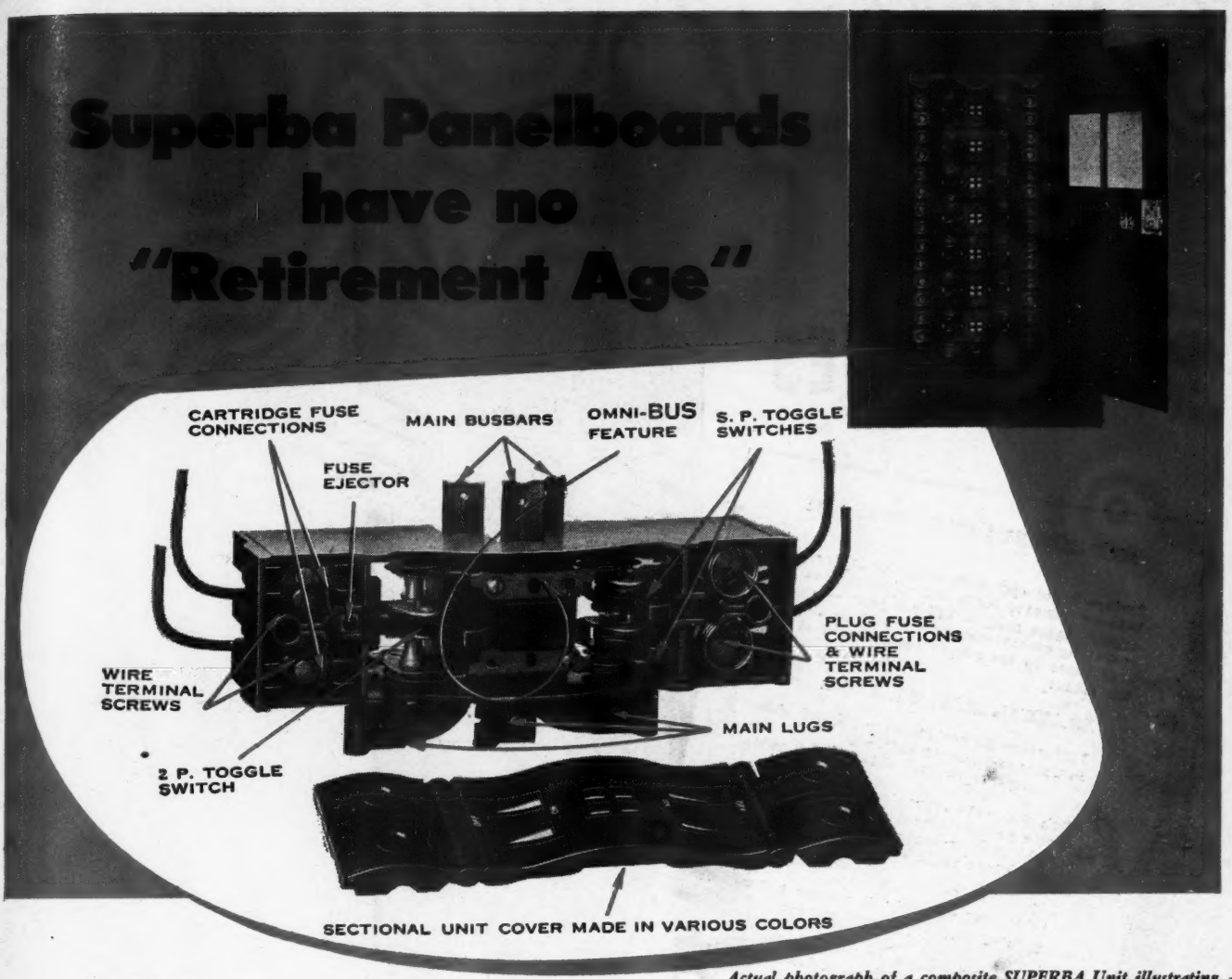
REPRESENTATIVES of leading ARROW Lines for residential lighting control. To ask for these numbers is to specify, in sum, the refinements of 56 years of fine switchmaking. . . No. TL-1 Lock — and TL-1 — single-pole on Bakelite base only $\frac{7}{8}$″ deep, $\frac{1}{2}$″ wide, $1\frac{1}{4}$″ long; designed for "Type C" lamp loads. No. 1611 — single-pole, composition base, 1″ deep. No. 6445-I — double-pole with "Ivorylite" handle; porcelain base 1″ deep. No. 6444 — single-pole, porcelain base 1″ deep. No. 1542 — double-pole (20 Ampere), Bakelite base $1\frac{1}{2}$″ deep. Send for Catalog of the *complete lines* these popular numbers typify.

ARROW ELECTRIC DIVISION

DISTRIBUTED THROUGH ELECTRICAL WHOLESALERS

THE ARROW-HART & HEGEMAN ELECTRIC COMPANY, HARTFORD, CONN., U. S. A.

Superba Panelboards have no "Retirement Age"



Actual photograph of a composite SUPERBA Unit illustrating Flexibility and Accessibility for inspecting, replacing or interchanging Toggle Switches, Fuse Connections or Bus Bar arrangements without removing cabinet door or trim.

6 FEATURES ... the secret of adaptability

Many a panelboard has been put out to pasture because it couldn't meet the challenge of changing electrical conditions.

But you need never worry about obsolescence when you install BullDog SUPERBA. There are six separate features of design and construction to insure complete safety, peak performance, unusual convertibility, easy maintenance and long life. Look them over:

1. **Toggle Switches:** Sturdy construction to withstand abuse . . . positive operation . . . quick make and quick break.
2. **Switch and Fuse Safety Interlock:** Doors over fuse compartments are interlocked with toggle switches so that fuses are always "dead" when accessible, although fuses can still be tested in circuit.
3. **Fuse Ejector:** In cartridge fuse type. Just a flip of the finger ejects the cartridge fuse with safety and convenience.
4. **Omni-bus Construction:** Permits ready change of voltage and phase, and balancing of load on the phases, after the panel is installed and without removal of door or trim or disturbing branch circuit wiring.
5. **Isolation Compartments:** Bus bars, fuses and switches are in separate compartments, preventing flash-overs and localizing trouble from short circuits or defective fuses.
6. **Smart Styling:** Surface or face plates of bakelite have a curved design with a variegated grain finish, lending beauty and symmetry to the panel's appearance..

Check these six advantages of SUPERBA Panelboards, and write for complete details on this modern, completely flexible equipment.

SUPERBA is adaptable to any of these systems:

125/250 V. Single Phase AC or DC Edison System.
125/250 V. Grounded Neutral Single Phase AC or DC Edison System.
125/250 V. Grounded Neutral 3 to 3-Wire Single Phase AC or DC Edison System.
120/208 V. 3-Phase, 4-Wire AC.
125 V. 3-Phase to Single Phase AC.
125 V. 2-2 Wire.

Bu!lDog Also Manufactures Vacu-Break Safety Switches—BUStribution DUCT—Switchboards—Circuit Master Breakers—Industrial Trol-E-Duct for Portable Tools, Cranes and Hoists—Universal Trol-E-Duct for completely flexible lighting.

BULLDOG

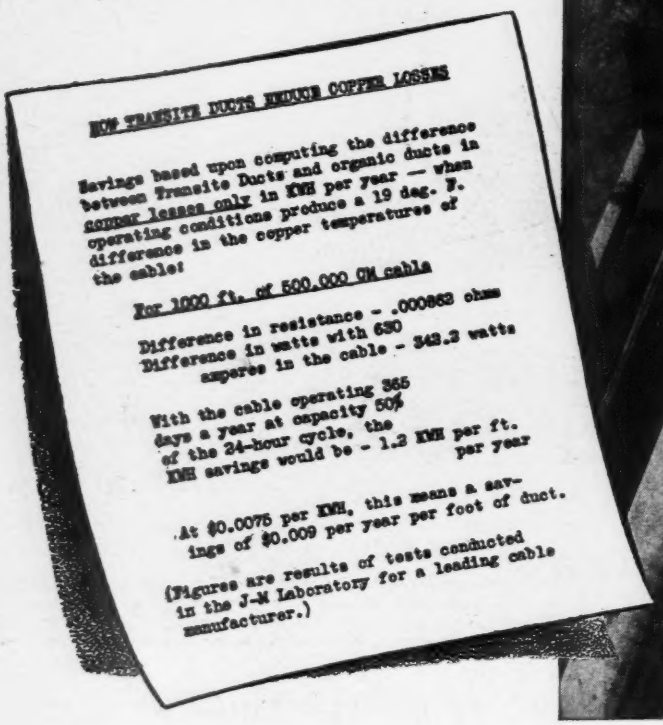
ELECTRICAL DISTRIBUTION SYSTEMS

BULLDOG ELECTRIC PRODUCTS COMPANY, DETROIT 32, MICHIGAN

In Canada: BullDog Electric Products, Ltd., Toronto. Field Engineering Offices in All Principal Cities

Cooler Cables in Transite Ducts mean...

LONGER LIFE *for* POWER LINES



HOW TRANSITE DUCTS REDUCE COPPER LOSSES

Savings based upon computing the difference between Transite Ducts and organic ducts in copper losses only in KWH per year — when operating conditions produce a 19 deg. F. difference in the copper temperatures of the cable:

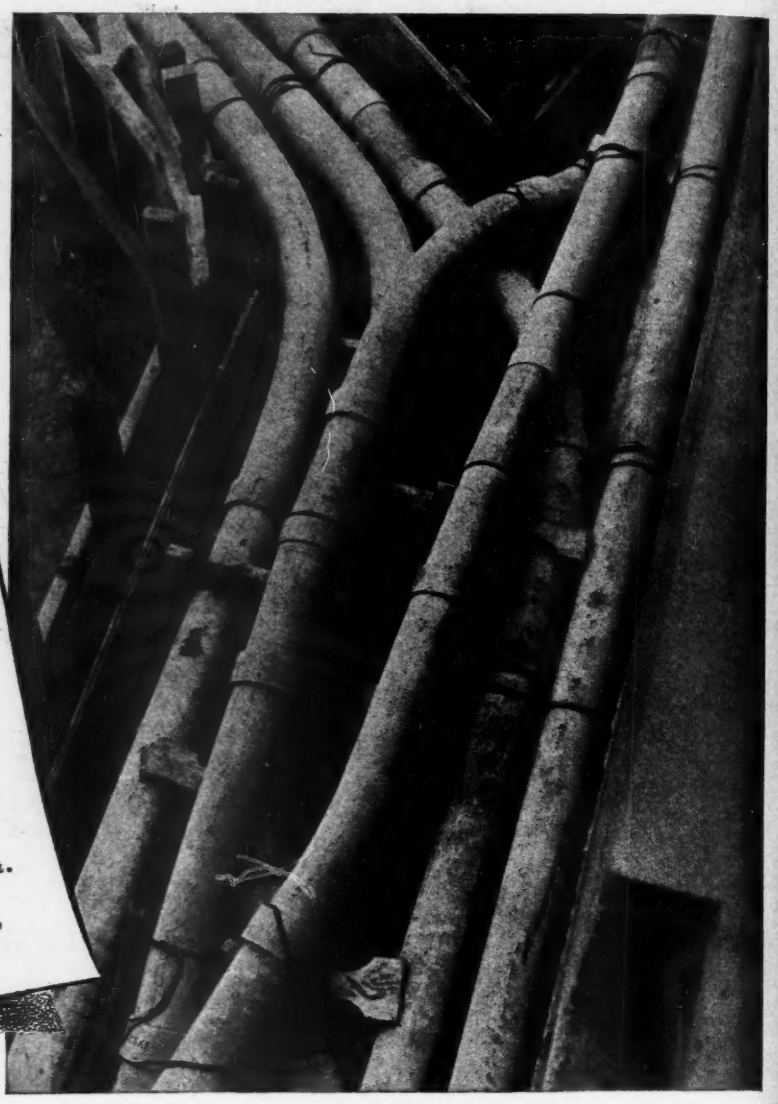
For 1000 ft. of 500,000 CM cable

Difference in resistance - .000863 ohms
Difference in watts with 630 amperes in the cable - 342.2 watts

With the cable operating 365 days a year at capacity 50% of the 24-hour cycle, the KWH savings would be - 1.2 KWH per ft. per year

At $0.0075 per KWH, this means a savings of $0.009 per year per foot of duct.

(Figures are results of tests conducted in the J-M Laboratory for a leading cable manufacturer.)



High cable temperatures increase cable costs all along the power line!

In Transite Ducts, where cables stay cooler —*reduced copper losses alone* represent a savings of 1.2 KWH per foot per year.

This test case is one of many conducted by Johns-Manville Research Engineers in co-operation with a leading cable manufacturer, proving that Transite Ducts keep cables cooler —dissipate I^2R losses 13% faster than other ductways tested. Copper losses are reduced, insulation life is prolonged . . . and current carrying capacity increases as much as 15%.

Made of asbestos and cement, Johns-Manville Transite Ducts are strong, immune to rust and rot. They are incombustible and unaffected by electrolysis or galvanic action. A permanently smooth bore makes possible long cable pulls and easy replacements. Long, lightweight lengths can be quickly and economically installed. In addition, a full line of fittings simplifies even the most complicated installations.

For full information write for Data Book DS-410; Johns-Manville, Box 290, New York 16, N. Y.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville **TRANSITE DUCTS**

CONDUIT for use without concrete

KORDUCT for concreting in

ARE YOUR MOTOR OR COIL WINDING COSTS *too High?*

IDEAL COIL WINDER DRIVE and HEADS

If you wind a lot of different kinds of coils, or if you wind many of the same kind, you'll save money hand over fist with the new IDEAL "Heavy Duty" Coil Winder Drive and Heads. Eliminate make-shift methods!

This *Ideal* combination speeds production, diminishes spoilage, and reduces cost. And quality far better! Every coil is wound uniformly, accurately, efficiently and with the correct number of turns.

Drive is compact with all controls in easy reach of the operator. Speeds are infinitely variable between "hi" and "lo" speeds of 41 to 410 RPM. Has plenty of power for most winding jobs. At 41 RPM when using a "Universal" Head, one can wind a 7½" round coil of No. 6AWG wire or a 16½" coil of No. 9AWG wire.

IDEAL COIL WINDER HEADS are available in five types, adjustable for winding many types and sizes of coils and armatures. Easy to set up, they quickly pay for themselves. One IDEAL Head eliminates the building and storing of numerous sizes of wooden frames which require a large amount of storage space, split, warp or wear out.

Ask your Jobber for an IDEAL Catalog covering our complete line of Coil Winding Equipment.

1976

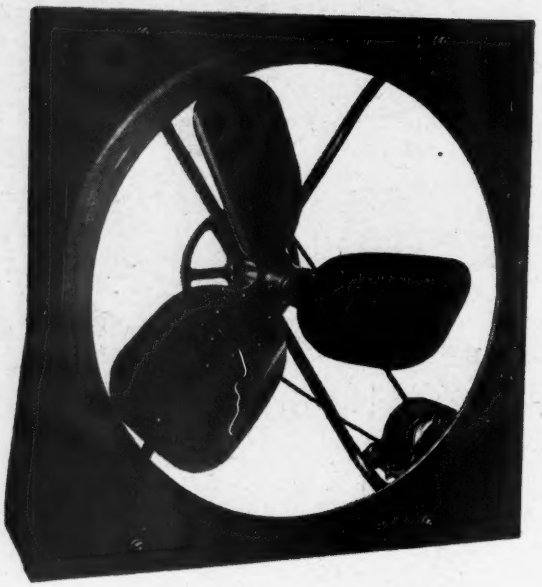
Distributed Through AMERICA'S LEADING WHOLESALERS

IDEAL INDUSTRIES, Inc.

(Successor to Ideal Commutator Dresser Co.)

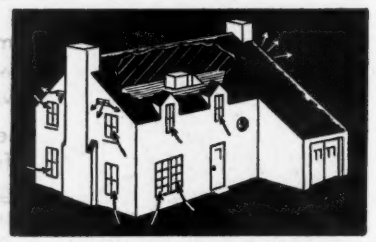
1041 PARK AVENUE • SYCAMORE, ILLINOIS

Unlimited USES!
Unlimited SALES
OPPORTUNITIES IN
LAU "NITEAIR"
EXHAUST FANS
for Homes, Offices and Factories



5 Diameter Sizes
Range of 8 Discharge Capacities

Everyone wants comfortable, refreshing sleeping, working, and shopping conditions. Lau "Niteair" propeller-type fans provide more real, long-term comfort than anything that could possibly be devised or procured on such small investment. Installed in homes—large or little—Lau fans expel daytime heat; replace it with fresh, cool, night air. They have many practical applications besides homes—in offices, stores, restaurants, factories, commercial buildings and others. Mass manufactured in straight line production for low-cost competitive selling. Sales are a snap. Profit potential, great.



Exhaust hot air. Pull in cool, fresh air.

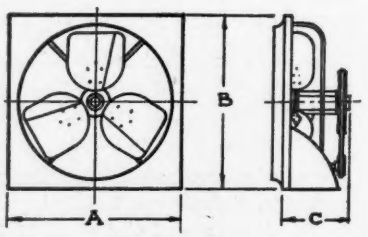
HUNDREDS OF APPLICATIONS

Here are a few—

Air-conditioning shops and offices
Removing dust-laden air in factories
Removing foul or contaminated air
Preventing dangerous fume penetration
(from one shop to another
or from shop to office)
Removing smoke from furnace rooms
Spot-cooling foundry workers

DIMENSIONS AND SPECIFICATIONS

Unit	Fan Size	A	B	C	C.F.M.	R.P.M.	H.P.
226L	22"	29	24½	11	3,800	700	1/6
304L	30"	38	38	13½	7,100	460	¼
364L	36"	42	42	13½	9,000	350	¼
363L	36"	42	42	13½	10,150	400	⅓
423L	42"	48	48	16	12,600	330	⅓
425L	42"	48	48	16	14,500	380	½
485L	48"	54	54	16	15,050	290	½
487L	48"	54	54	16	18,000	332	¾



Write us direct or contact your jobber.

THE LAU BLOWER COMPANY

DAYTON 7, OHIO, U. S. A.

WORLD'S LARGEST MANUFACTURER OF FURNACE BLOWERS

Engineers and fabricators of general Air Handling Equipment • Single Inlet and Double Inlet Blowers • Propeller Fans • Accessories

40 Watts - Lamp rating
-38 Watts - ballast output
2 Watts deficiency = 5% LOSS
40 Watts - Lamp rating
-40 Watts - ballast output
00 Watts deficiency = 100% lamp light output

Here's why Acme Electric Fluorescent Ballasts are *BETTER*

For maximum light output, fluorescent lamps reauire the rated watt input for which they were designed. A ballast that delivers only 38 watts to a 40 watt lamp is 5% deficient and that loss is reflected in lamp light output.

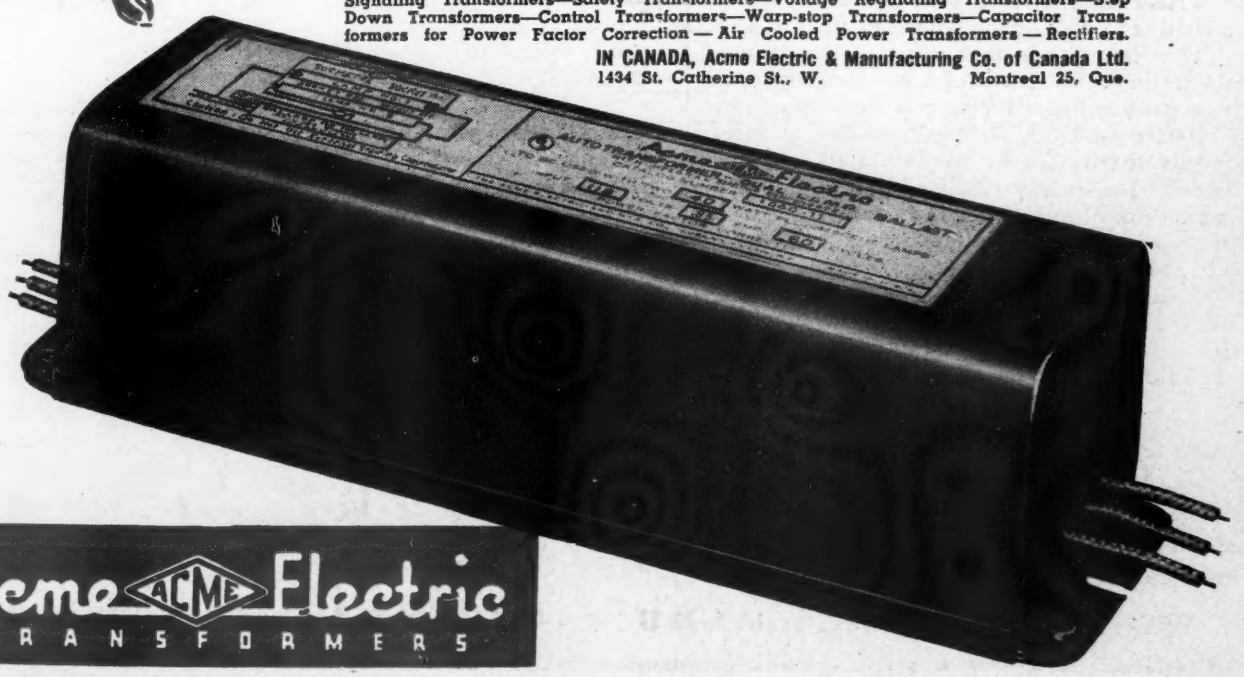
Acme Electric fluorescent lamp ballasts are designed to deliver to the lamp the full watt output for which they are rated. In addition, secondary operating voltages exactly meet the secondary voltage specifications of each lamp. These are important electrical characteristics that make Acme Electric ballasts better in performance, efficiency, service.

ACME ELECTRIC CORPORATION

36 WATER STREET • • • • • • CUBA, N. Y.

Acme Electric manufactures Luminous Tube Transformers—Fluorescent Lamp Ballasts—Cold Cathode Lighting Transformers and Ballasts—Mercury Vapor Lighting Transformers—Radio and Television Transformers—Electronic Transformers—Door Bell, Chime and Signaling Transformers—Safety Transformers—Voltage Regulating Transformers—Step Down Transformers—Control Transformers—Warp-stop Transformers—Capacitor Transformers for Power Factor Correction — Air Cooled Power Transformers — Rectifiers.

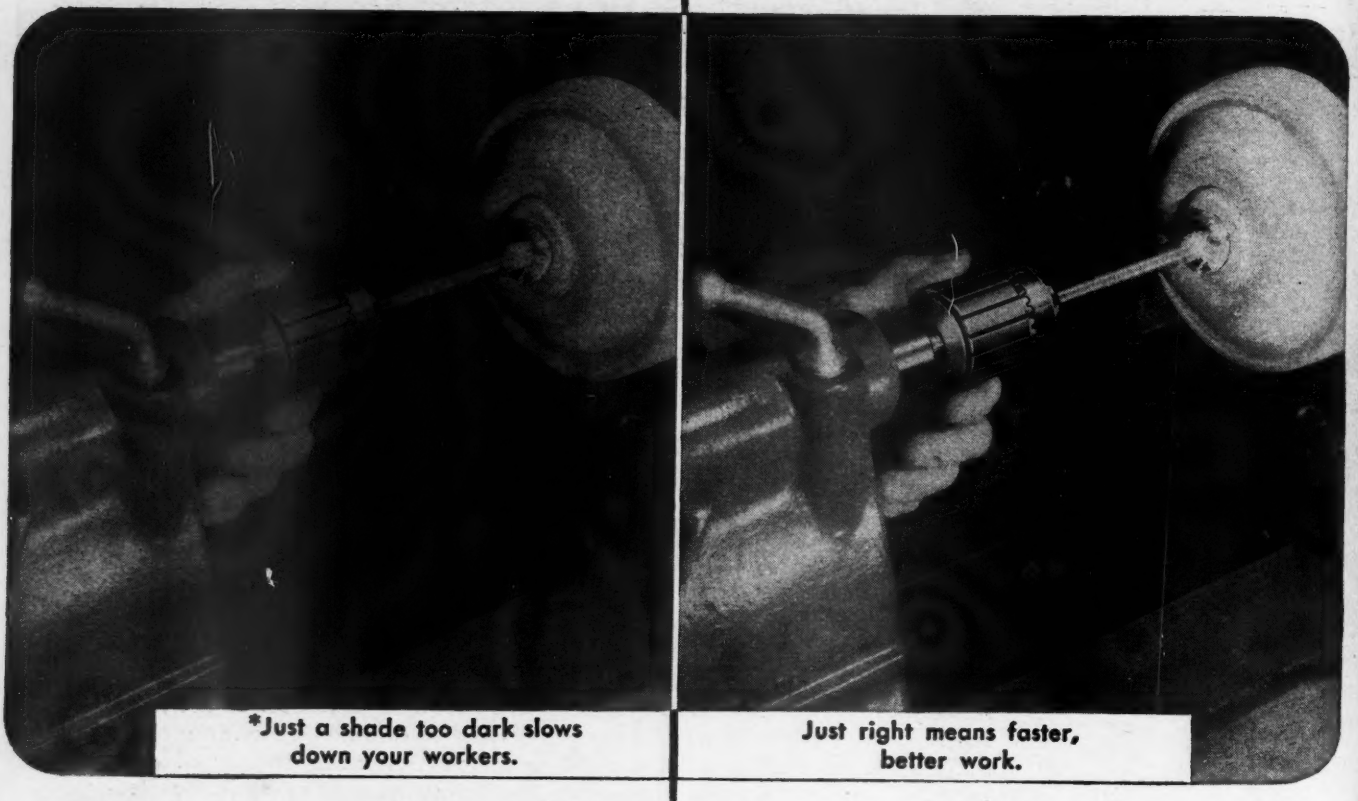
IN CANADA, Acme Electric & Manufacturing Co. of Canada Ltd.
1434 St. Catherine St., W. Montreal 25, Que.



Acme ACME Electric
TRANSFORMERS

BORDERLINE VISION*

May be hampering production in your plant!



*Just a shade too dark slows down your workers.

Just right means faster, better work.

Eliminate lighting handicaps with Wheeler Skilled Lighting

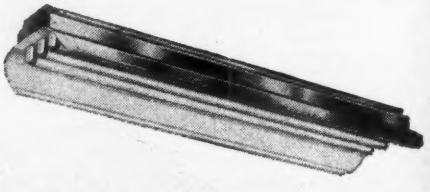
THE LIGHTING in your plant may *look* all right at a glance, yet be just a shade too dull or too bright in some places. Watch out!

That may mean that some workmen need two-looks-to-make-*sure* – and waste time. Or that they take chances on one look – *and rejects.* In either case production is hampered and costs go up!

Better work and reduced costs are practically automatic when you install evenly distributed shadow-free light, with efficient Wheeler Reflectors. Product of 64 years of specialized lighting experience, they are engineered to get maximum illumination *from standard lamps;* to stand up longer; to require less maintenance, for they are made of heavy-duty materials and high-grade vitreous enamel only.

Learn how Wheeler Reflectors and skilled lighting can bring you efficient lighting and cut your costs. Send for catalogs showing complete line of incandescent and fluorescent lighting fixtures. **Wheeler Reflector Company, 275 Congress Street, Boston 10, Mass.** Also New York, and principal cities.

Distributed Exclusively Through Electrical Wholesalers



All-Steel Open-End Fluorescent Unit

Available for two or three 40-watt, or two 100-watt lamps. Broad wiring channel with accessible, enclosed ballast. Mounts from chain or conduit, individually or in continuous runs.

RLM Solid Neck Incandescent Reflector

Maximum lighting efficiency for either indoor or outdoor use. Expertly designed, ruggedly built. 75 to 1500 watts.

Wheeler Reflectors

(SKILLED LIGHTING)

MADE BY SPECIALISTS IN LIGHTING EQUIPMENT SINCE 1881

You Can Always Rely on RACO!

RACO

SWITCH BOXES

OUTLET BOXES

Many other types also available . . .
A BOX FOR EVERY NEED

Remember, you can always Rely on Raco! It's more than a catch-phrase, more than a slogan—it's your positive assurance of a quality line that's preferred by electrical contractors, architects, and builders the country over! And, here's why:

THEY'RE CLEAN—no ragged or rough edges—attractively finished!

THEY'RE UNIFORM—every Raco product is made to the same exact measurements.

THEY'RE DEPENDABLE—the Raco line is backed by more than 34 years' experience in the designing, engineering, and production of steel products.

THEY'RE PACKAGED—Raco boxes come packed in cartons. Easy to stock, inventory and identify.

Write today for your free copy of catalog on Raco products. It's the dependable line that you can install with pride—today—tomorrow—and for many years ahead.

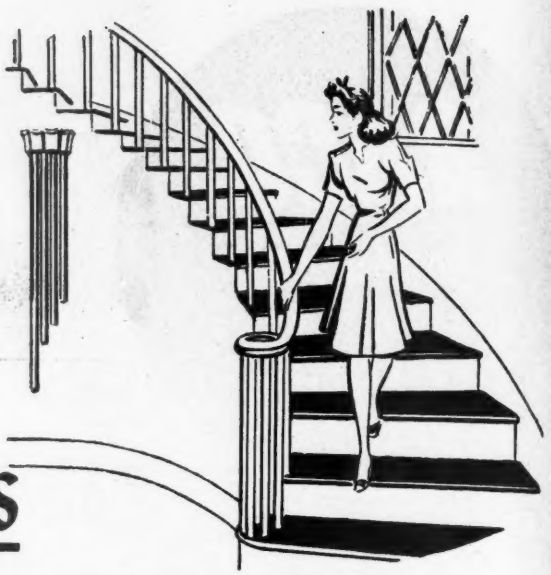
ALL-STEEL EQUIPMENT, INC.
600 Kensington Ave., Aurora, Ill.

RACO
ALL-STEEL PRODUCTS

A Complete Line of Switch and Outlet Boxes

ALL-STEEL EQUIPMENT, INC.

A LITTLE THING, YES . . .



BUT HOW IT COUNTS WITH YOUR CLIENTS!

The average home buyer may know little or nothing about the fine points of quality construction. But he *does* know something about fixtures and appliances. And if they are brands he recognizes and respects, the house in which he finds them takes on added value.

In the door-chime field, no name is more widely known or more respected than the name—NUTONE. So many people prefer this brand that NUTONE is today the world's largest maker of door chimes.

This preference stems from our determination to make the best door chimes money can buy—at prices to suit every man's purse (from $3.95 to $59.95). Then, too, there's such a *variety* of NUTONE Chimes—fourteen in all. Compact, two-note models; short-tube chimes; a combination *Telechron* Kitchen Clock and NUTONE Door Chime with a large, legible dial; long-tube chimes in two-note and combination four- and eight-note styles—some with fine built-in hall clocks. Each is styled and colored to blend with all interior designs and wall finishes. They're easy to install and simple to service.

A NUTONE Door Chime helps make a house a home. It's a little thing, yes . . . but how it *counts* with your clients! Write today for folder illustrating and describing all 14 NUTONE Door Chime models.

. . . better living means better listening, too!

NUTONE TRADE MARK DOOR CHIMES

NUTONE, Incorporated, Merchandise Mart, Chicago 54; 200 Fifth Ave., New York 10; 931 E. 31st St., Los Angeles 11; or Terminal Sales Bldg., Seattle 1.

Super-stik Jobbers from Coast to Coast

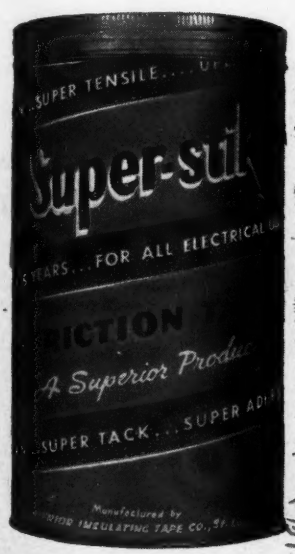
The "Who's Who" of the Electrical Industry

Proud of ourselves? Well, we're proud of our product *and* the people who distribute it for us. Ninety-six of the top jobbers in the industry—jobbers who buy and sell quality merchandise only, are our selling agents. They know that although Super-stik may *sell* for a little more, it does *its job* far beyond its extra cost!

Write for a free "test-it-yourself" splice. Mailed without charge.

Water soak it. Sun bake it. You'll see why Super-stik is best.

SUPERIOR INSULATING TAPE CO.,
St. Louis, Mo., U.S.A.
Established 1923



PACKED 10 ROLLS TO THE CAN

Super-stik

FRICTION TAPE

"Sticks to the End"

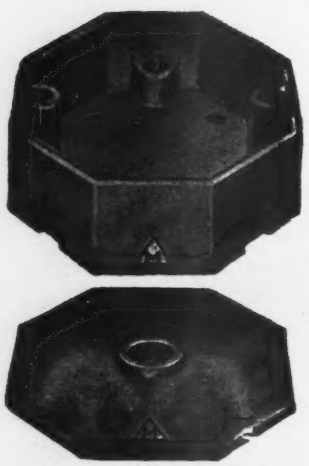
ILLINOIS
PORCELAIN WIREHOLDER INSULATORS

Insure SAFE HOUSE SERVICE CONNECTIONS..

• When you use Wireholder Insulators with the name "ILLINOIS" you are backing up your work with the right quality for the job.

All corners are rounded to prevent injury to the insulation of the wires. The screws have deep, sharp threads for easy installation. The screws are fastened into the insulators with non-shrinking metal alloy. The all-steel screws are hot galvanized by a special process to insure a smooth, even coating. Will not cause rust streaks on the sides of buildings. These dry process wireholders are made in sufficient styles and sizes to meet all requirements. Wet process porcelain supplied on special order.

OUTLET BOXES



Glazed and unglazed styles conforming to all existing standards of dimensions, spacing, position of knockout holes, and mounting screws. High mechanical and electrical efficiency.

ALL-PORCELAIN ILLINOIS SYSTEMS

for outstanding, adequate and modern wiring jobs

SWITCH BOXES

Insure greater safety in wiring and the elimination of all grounding hazards. Made of the best quality of white porcelain. Metal inserts are placed in two holes of the switch boxes for receiving screws of standard switches, plug outlets, etc. Knockouts for single wires, also for cables. Specify and use them.

Bull Dog

KNOBS

Cement coated — extra length nail—genuine leather washer — code standard. They don't chip when driven in and they do stay in place and have a firm grip. Available in a wide variety of heights, diameters, holes, and grooves.

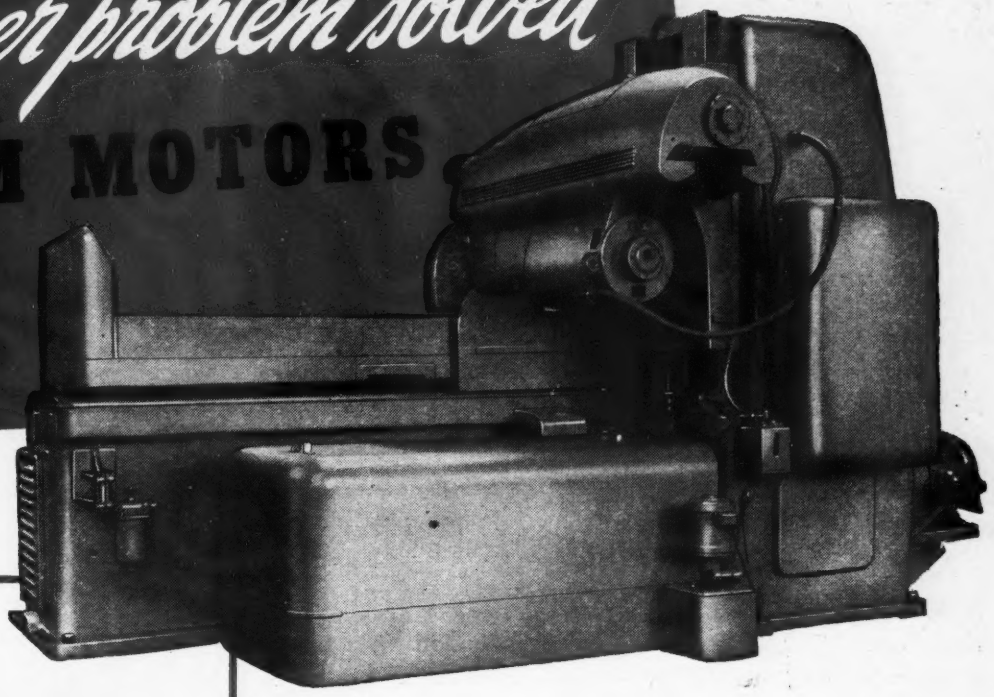
STANDARD TUBES

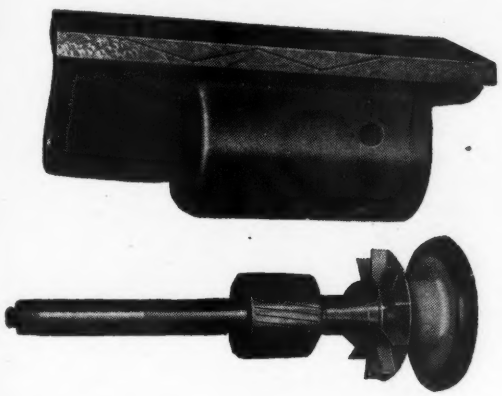
in sizes 1/2 to 48 inches, 5/16 to 3 inches diameter in following types: unglazed, glazed, split, floor split floor, headless, curved and, crossover split, and cross over. Diameters all uniform both inside and outside.

ILLINOIS ELECTRIC PORCELAIN COMPANY *Macomb, Illinois*

Another problem solved

by R & M MOTORS





ONE SIZE OF SPINDLE HEAD CASTING FOR ALL MOTORS

Ventilating air is drawn in at the top opposite the spindle end, conducted through cast passages around the bearings, and returned over stator and rotor to exhaust from the side. Motor rating and speed are determined by length of rotor. Stator diameter is always the same so that only one size of spindle head casting is needed. Compact design provides adequate work head clearance with minimum column height. Rotor and stator by R & M.

REALLY SMOOTH OPERATION

Motor vibration. You've felt it. Seen it. And, perhaps, put up with it. But on precision surface grinders there just can't be *any*. Few other applications require motors so perfectly balanced, so smooth-running.

One reason why Thompson Surface Grinders are famous for accuracy is their *vibrationless* R & M motors. Thompson and R & M engineers saw to that. Together, they developed a special spindle head motor that takes less space; ventilates perfectly in air heavily laden with coolant; retains the *same* stator diameter for the full range of motor ratings and speeds.

Vibrationless operation of the hydraulic table control and coolant pump motors is no less important. The coolant pump motor is only ¼-h.p., yet even on the 32,000-lb. grinder, above, a rotor just *slightly* out of balance, or with uneven air gap or minor electrical disturbances, would cause "ripples" in the surface worked. Standard R & M motors, with refinements in shaft and rotor balance, serve these two uses nicely.

Meeting unusual motor needs has been an R & M specialty for many years. That's why you're finding more and more R & M motors on more and more modern equipment. Look for them. Ask for them. You'll *like* the way R & M motors perform.

ROBBINS & MYERS • INC. MOTOR DIVISION • SPRINGFIELD, OHIO
In Canada: Robbins & Myers Co., of Canada, Ltd., Brantford, Ont.

MOTORS • HOISTS • CRANES • MACHINE DRIVES • FANS • MOYNO PUMPS • FOUNDED 1878

8 GOOD REASONS WHY!!!

...Wire insulated with GEON for manufacturing, domestic, industrial, and utilities wiring...

Excellent electrical properties

Thin coating of insulation

More conductors in a given space

Ease of handling

Easy stripping

Light weight

Resistance to ozone, wear, sunlight, water, chemicals, and most other normally destructive factors

14 colors including NEMA standards

Be sure to specify wire or cable insulated with GEON in order to get *all* these advantages. Or, for information regarding special applications please write Department Y-10, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

Geon
Polyvinyl Materials
A TRADE MARK OF B. F. GOODRICH CHEMICAL COMPANY

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

Freddy Firefly delivers the goods

Distributed only through electrical wholesalers

Yes... today you can order ***Firefly*** fixtures with confidence . . . for our daily deliveries on most models are now rolling out of our shipping room in carload quantities . . . to light up thousands of offices, stores, factories and homes all over America. Place your order now.

Send for our new catalog.

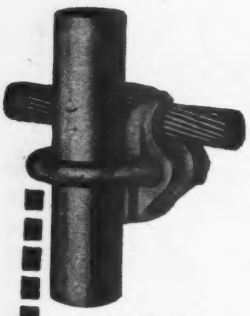
KAHN MFG. CO. INC.

2051 NORTH 19TH STREET MILWAUKEE 5, WIS.

O.Z. KNOWS CONNECTORS

FROM THE GROUND UP

Whether in the depths of a mine or the towers of a skyscraper, wiring jobs done with O.Z. fittings *go in faster... stay in longer.* For typical reasons, check the advantages, below, of just two of the many O.Z. ground connectors. You'll see why engineers say— **"They're OK if they're O.Z."**



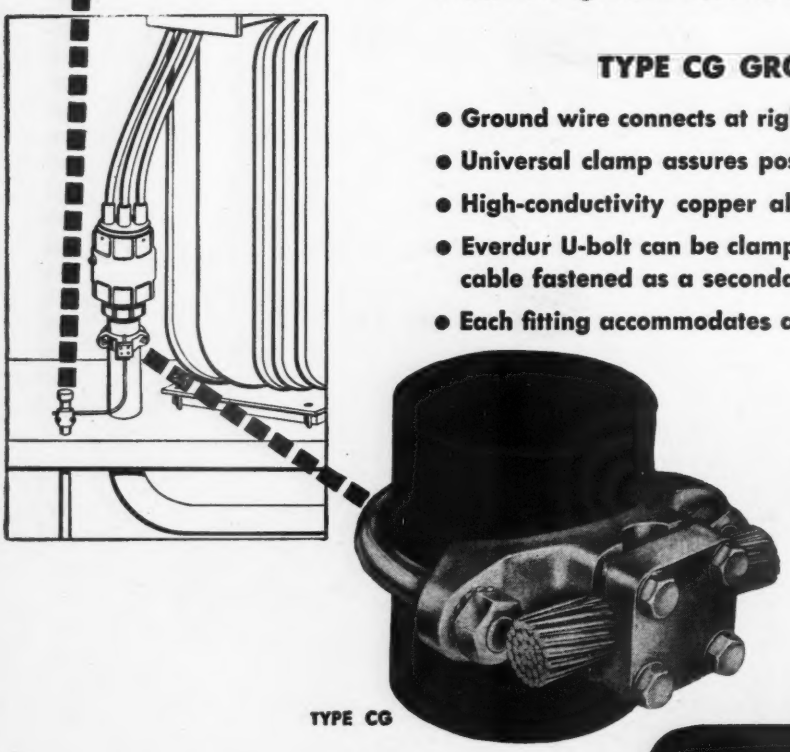
TYPE AG

TYPE AG GROUND CONNECTORS

- Top clamp plate is ribbed for strength... eliminates distortion.
- High-conductivity copper alloy... resists corrosion.
- Interlocking pivoted clamp insures maximum circular pressure.
- Single Everdur U-bolt secures cable to ground rod... reduces assembly time.
- Each fitting accommodates a wide range of cable sizes.

TYPE CG GROUND CONNECTORS

- Ground wire connects at right angles or parallel to pipe.
- Universal clamp assures positive contact in either direction.
- High-conductivity copper alloy... resists corrosion.
- Everdur U-bolt can be clamped in place on rod or pipe and ground cable fastened as a secondary operation.
- Each fitting accommodates a wide range of wire sizes.



TYPE CG

More and more electrical wholesalers are stocking O. Z. fittings. See your local distributor today. Write us for catalog detailing sizes, features, and prices of the complete O.Z. line.

© 2024

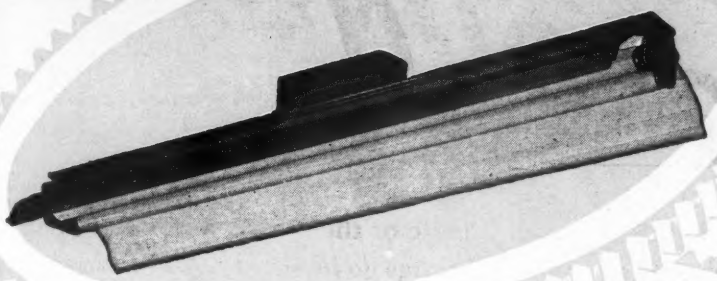
CONDUIT FITTINGS • CABLE TERMINATORS
CAST IRON BOXES • SOLDERLESS CONNECTORS
GROUNDING DEVICES • POWER CONNECTORS

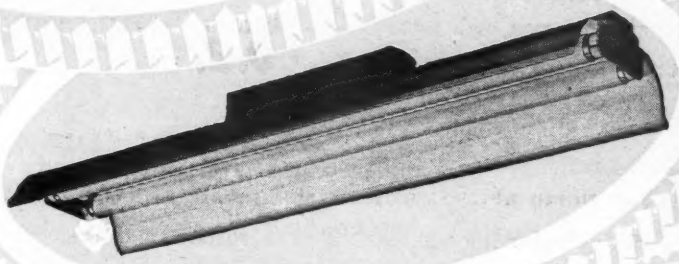
O.Z. ELECTRICAL MANUFACTURING COMPANY

262 BOND STREET · BROOKLYN, 2 N. Y.

AUTUMN WEDDING—PROFIT HONEYMOON—WITH

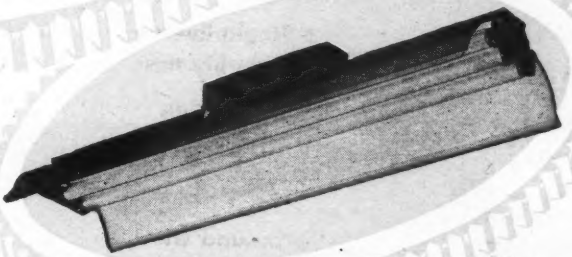
HOLDENLINE CHAN'L-RUN



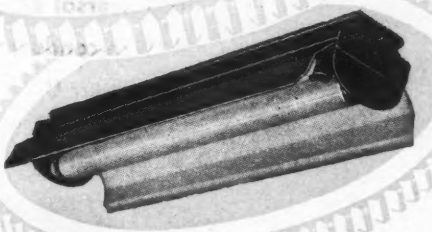


There's a new bond between electrical men and HOLDENline CHAN'L-RUN, a lasting honeymoon blessed with sweet profits. This Fall, smart wholesalers and contractors are choosing the Holdenline family of fixtures—a family related by the famous rigid steel channel that gives CHAN'L-RUN its name.

Inherent in both the long-established industrial line—and in all the dramatic new family of fixtures still to come—is the strength, durability and flexibility that assures ease of installation and maintenance, economy of operation and customer satisfaction, fixtures that sell easily and stay sold.



No union between electrical men and HOLDENline would be complete without a promise for the future. Soon—the new HOLDENline commercial (LC) series will join this famous industrial family. Then—HOLDENline CHAN'L-RUN will help you meet *every* lighting problem, offer you the right fixture with the right lighting intensity to do a completely related lighting job.



If you haven't seen the Holdenline Chan'l-run bulletins, ask your wholesaler or write to

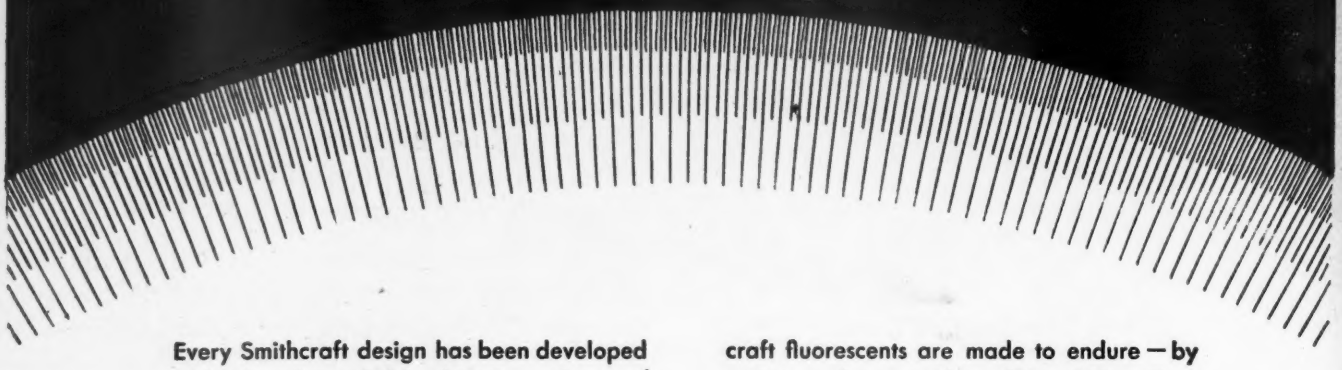
HOLDENLINE COMPANY

Pioneers in Fluorescent

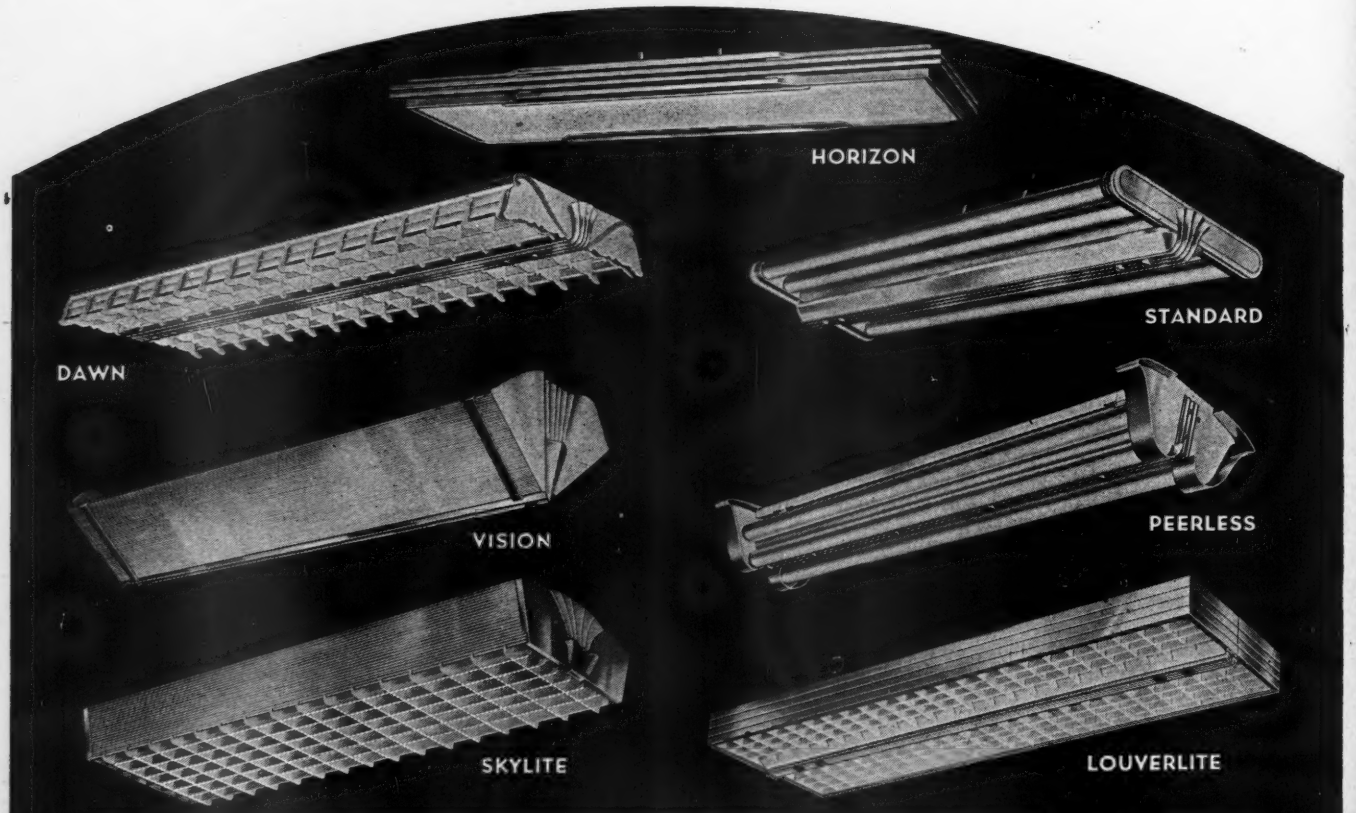
2301 SCRANTON ROAD • CLEVELAND 13, OHIO

Smithcraft THE FLUORESCENT

with custom-made quality and appearance



Every Smithcraft design has been developed with the three-fold objective of smart appearance, efficient lighting, and long operating service. Each fixture is beautifully designed and built to meet special lighting requirements. Rigid in construction and carefully inspected and tested, Smithcraft fluorescents are made to endure — by master craftsmen with traditional New England pride in superlative workmanship. Thus into every Smithcraft fixture goes a plus which has justly earned for the Smithcraft line the reputation of being the top standard of quality and design in the lighting field.

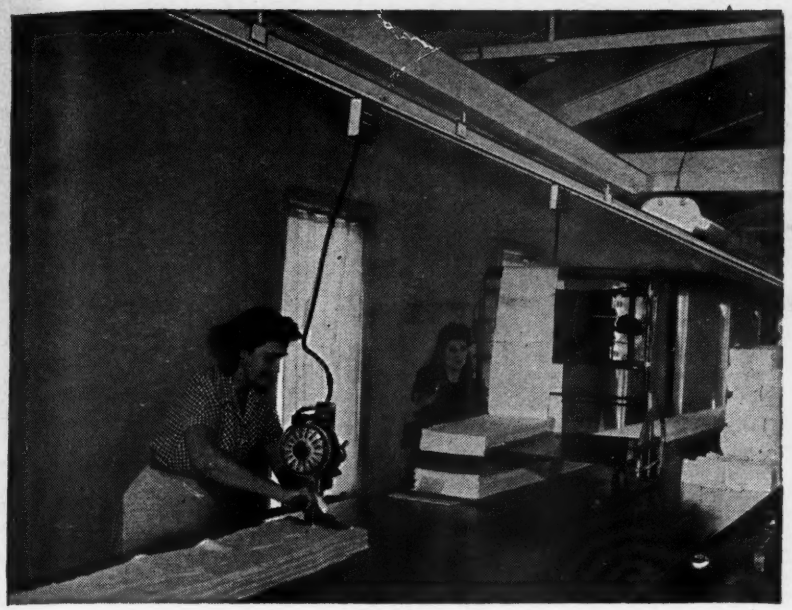


A Complete Line of Industrial and Commercial Fluorescents

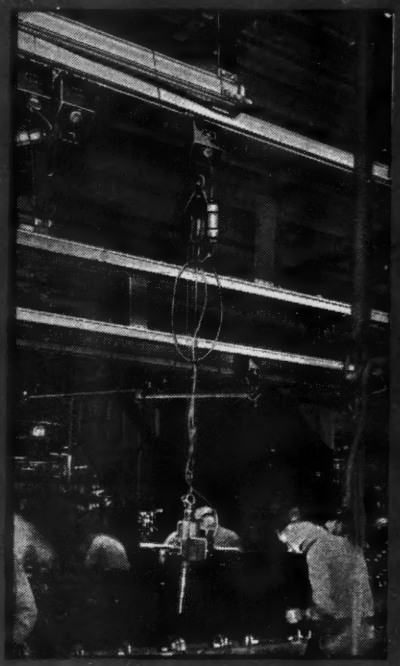
Distributed exclusively Through Electrical Wholesalers

Smithcraft

LIGHTING DIVISION
Chelsea 50, Mass.



FEEDRAIL used for cutting machine and moving cloth laying machine with inspection light.



FEEDRAIL supporting high-cycle portable tool and balancer in machine shop

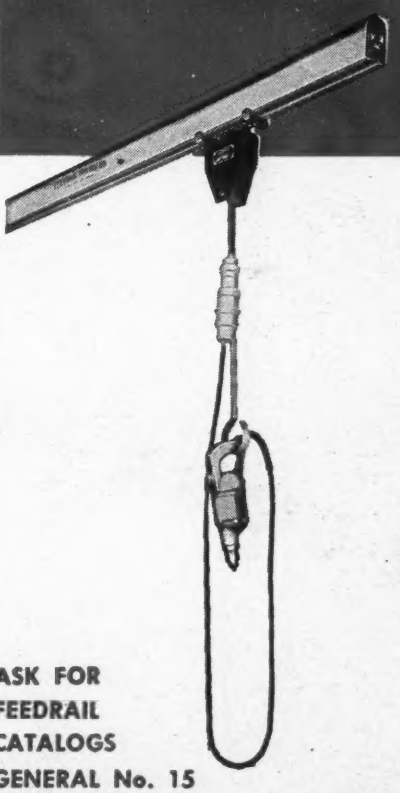
KEEP TOOLS AND CABLES OFF THE FLOOR *with* ELECTRIC FEEDRAIL

FEEDRAIL is an enclosed electric busway system that supports and feeds portable tools. Heavy duty FEEDRAIL trolleys may be equipped with counterbalances to help support the tools. A dead-front fuse block on each trolley or EVER-LOK connectors provides individual protection for high cycle or universal tools.

All electrical contacts are enclosed, and protected from mechanical injury and dust and the system is grounded. Each section carries the Underwriters' Label.

Keeps cables and tools off the floor — no accidental disconnection — no delay — and safety everywhere.

FEEDRAIL is ideal for modernization of any plant that requires production changes from time to time. Also for moving test lines, monorails, cranes and hoists.



ASK FOR
FEEDRAIL
CATALOGS
GENERAL No. 15
NEEDLE TRADES No. 16
MACHINE TOOL No. 17

ELECTRIC FEEDRAIL

FEEDRAIL CORPORATION

Subsidiary of Russell & Stoll Company

125 BARCLAY STREET NEW YORK 7, N. Y.

All-bright

PRESENTS

THE ULTRA IN FLUORESCENT LIGHTIN

CAN SAY, advisedly, that there ably is a custom ALL-BRIGHT ready to meet all lighting requirements, and if there is not, our engineering department will study individual problems and design a lighting system that will scientifically do the job expected. . . . *The unit shown above*—the R.E.C. recess Luminaire—aside from its eye-appeal, is a practical exactly designed fixture with these two outstanding features—Self-aligning Level Mounting Clips which automatically adjust frame to any irregular surface or uneven ceiling and assure a snug, smooth, over-all fit—and Rigid Piano-Hinged Frame with Quick Slide Catch which always remains attached to housing. When open hangs vertically affording easy access to entire housing where all component parts are assembled on reflector. Available wired or unwired.

Let us send illustrated folders on our line.

LIGHT RIGHT WITH *All-bright*

Designed for

★ **BETTER EFFICIENCY**
★ **BETTER LIGHT**
★ **EASY MAINTENANCE**

1 Custom built "Skylight" Unit. Ceiling or suspension mounting—individual row. All parts easily accessible without dismounting fixture. Bottom panel of translucent skytex ribbed glass. These units also available wired for D.C.

No. RU204 — 4 Lite 20 Watt, 25" Long
No. RU404 — 4 Lite 40 Watt, 49" Long
No. RU402 — 2 Lite 40 Watt, 49" Long

2 Super Skylight luminaire produces the plus punch you need for mounting heights over 12 ft. Can be furnished with either eggcrate metal louvre or Skytex ribbed glass bottom panels. Side glass panels of Linex Satinol. Furnished either flush or suspension mounting — individual or continuous rows.

No. RU-1002 Lite 100 Watt, 61" Long

3 Exposed Commercial Unit, ceiling or suspension mounting. Individual or Continuous row. Stems from 6" to 72". Finish—Baked white enamel. Body same as RU404. Can be changed without dismounting to glass enclosed type. These units also available wired D.C.

No. HF402—2 Lite 40 Watt
No. HF404—4 Lite 40 Watt

4 Industrial Type Unit. Sockets mounted on removable plates. Can be serviced by removing reflectors held by two wing nuts. Louvered top, assuring exceptional long life of ballast. Remote starters accessible without removing lamps. Furnished with screw eyes for easy leveling. Provision for switch. ½" Knockouts in tops and ends.

No. CR402—2 Lite 40 Watt
No. CR403—3 Lite 40 Watt
No. CR1002—2 Lite 100 Watt

5 V-shaped glass enclosed Unit. Flush or ceiling mounting. Finish—Baked white enamel with clear Skytex glass.

VG152—2 Lite 15 Watt, 19" Long
VG153—3 Lite 15 Watt, 19" Long
VG202—2 Lite 20 Watt, 25" Long
VG203—3 Lite 20 Watt, 25" Long

6 Recessed Type Unit for mounting into ceiling with fixture hidden. Flexible, to fit flush in uneven ceiling. REC240 and 440 available with hinged frame with glass or louver.

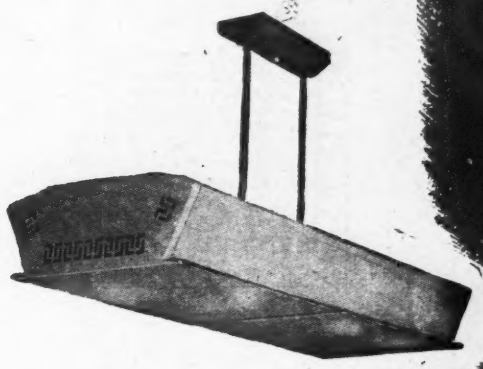
REC220—2 Lite 20 Watt, 24" Long
REC320—3 Lite 20 Watt, 24" Long
REC420—4 Lite 20 Watt, 24" Long
REC240—2 Lite 40 Watt, 48" Long
REC440—4 Lite 40 Watt, 48" Long
REC2100—2 Lite 100 Watt, 60" Long

7 Kitchen Type Fixture. Plug in adapter type 4" or 6", also ceiling mounting type with canopy and strap 5" and 6" or Flush mounting.

KT152—2 Lite 15 Watt, 19" Long
KT202—2 Lite 20 Watt, 25" Long
KT153—3 Lite 15 Watt, 19" Long
KT203—3 Lite 20 Watt, 25" Long

8 Strip Channel Lighting. Finish—Baked white enamel. ½" Knockouts in top and ends.

C151—1 Lite 15 Watt, 19" Long
C201—1 Lite 20 Watt, 25" Long
C301—1 Lite 30 Watt, 37" Long
C401—1 Lite 40 Watt, 49" Long
C202/49—2 Lite 20 Watt Tandem, 49", wired for D.C.



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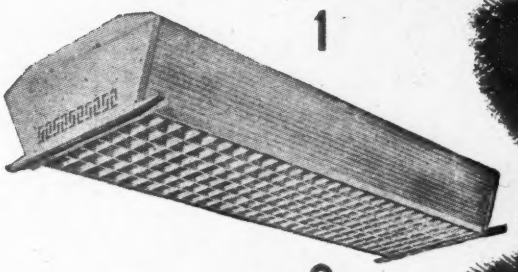

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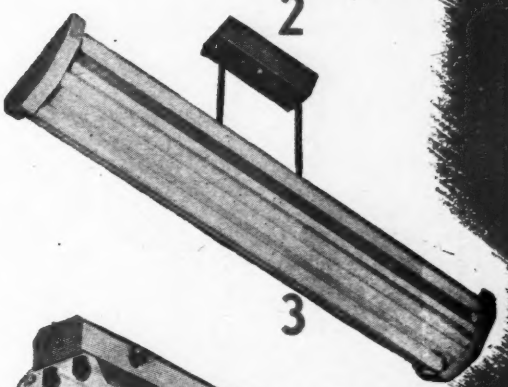

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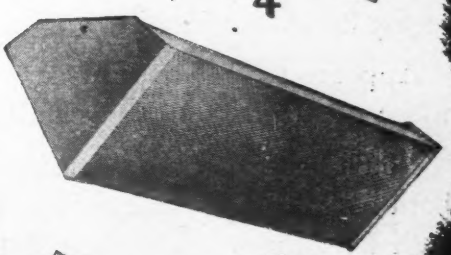

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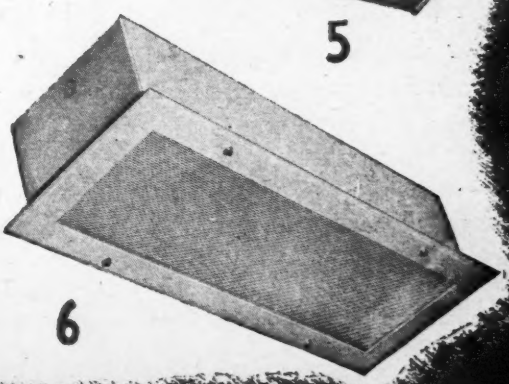

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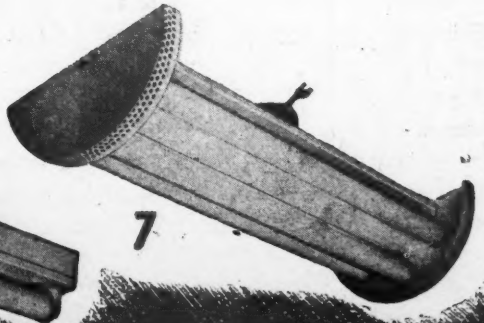

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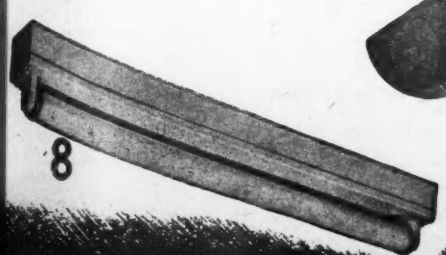


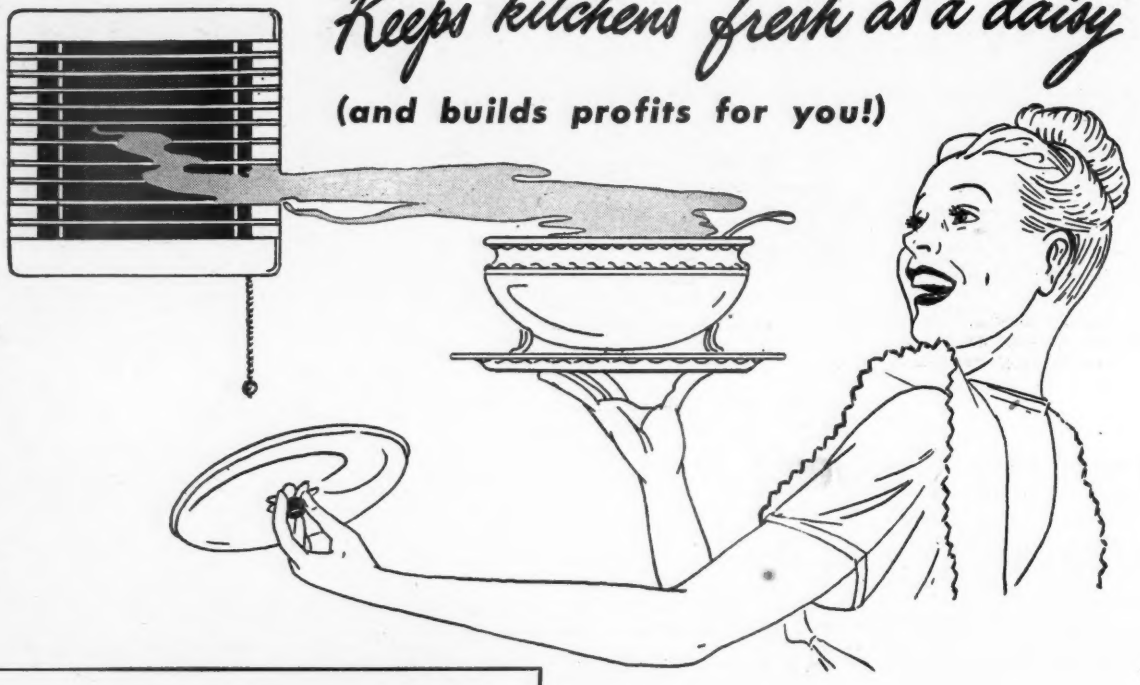
8

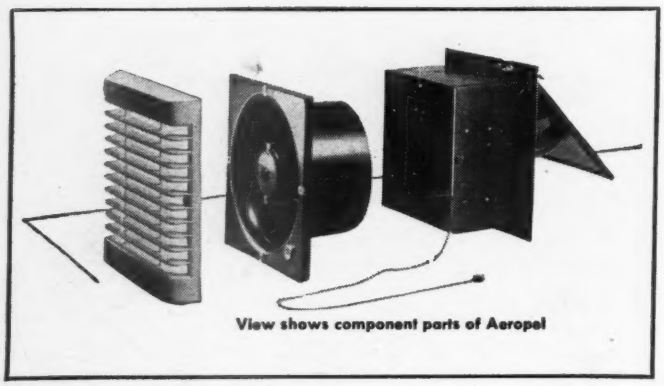
ELECTRIC PRODUCTS COMPANY
MANUFACTURERS OF FLUORESCENT LIGHTING FIXTURES
3917 28 [illegible] AVENUE CHICAGO 18, ILLINOIS

Aeropel

Keeps kitchens fresh as a daisy

(and builds profits for you!)





View shows component parts of Aeropel

You'll find that housewives love the new Aeropel Home Ventilator because homes stay cooler and cleaner. Aeropel whisks out cooking odors, greasy fumes and smoke.

Appearance is modern—with a spotless white plastic grille. Operation is super-quiet.

You'll appreciate the easy, fast installation in both old and new homes. Styling harmonizes with *all* kitchen plans—and there are many other sales opportunities for Aeropel in bedrooms, bathrooms, nurseries, laundries, recreation and utility rooms.

You can sell Aeropel, too, for individual ventilation of many offices, reception, conference and rest rooms.

Check the price—it's right for competitive selling. *Compare the performance and appearance of Aeropel with any other fan.* You'll agree that you should sell this new home ventilator that is *designed and built* by American Blower.

Join the dealers who are finding Aeropel a profitable, fast-moving item. Take advantage of Aeropel advertising that is attracting more customers than ever before. Ask your jobber about Aeropel Home Ventilators—TODAY!

FREE Aeropel Booklets

A beautiful full-color booklet will make selling Aeropel still easier. Here are specifications, installation details, typical kitchen installations—full information—in convenient, attractive form for your customers.

AMERICAN BLOWER

Aeropel

HOME VENTILATOR

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN

Division of American Radiator & Standard Sanitary Corporation

BEES IN HIS BALLAST?

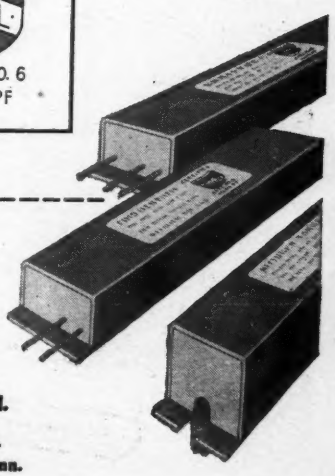
You can prevent it . . . with Certified Ballasts! And here's why:

The hum from fluorescent lamp ballasts can be a pretty annoying thing to a user . . . and before the advent of Certified Ballasts it was often present.

But if properly installed, Certified Ballasts are *quiet.* They have to be, or they wouldn't be *Certified.* This means that these Ballasts are made to rigid specifications set up by foremost lighting engineers. They are tested, checked and *Certified* as meeting the specifications by impartial experts, Electrical Testing Laboratories, Inc. It's this kind of protection that is responsible for not only quiet operation but a dozen other important customer benefits . . . all good reasons why it pays to recommend fixtures that are equipped with Certified Ballasts.

Be sure the ballasts in your lighting equipment bear the famous ETL Certification mark!

CERTIFIED
E·T·L·
SPEC. NO. 6
HIGH PF



Certified Ballast Manufacturers

Makers of Certified Ballasts for Fluorescent Lighting Fixtures

ACME ELECTRIC CORPORATION
Cuba, New York

CHICAGO TRANSFORMER DIVISION
Essex Wire Corporation
3501 Addison St., Chicago, Illinois

GENERAL ELECTRIC CO.
Speciality Transformer Division
Fort Wayne, Ind.

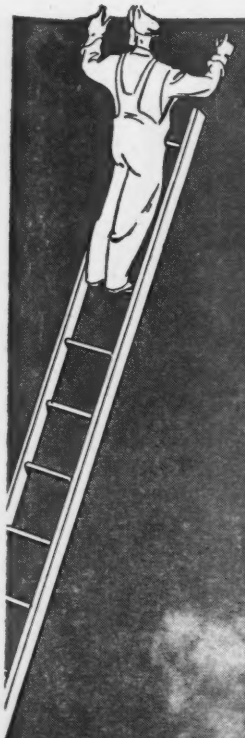
JEFFERSON ELECTRIC CO.
Bellwood, Illinois

SOLA ELECTRIC CO.
2525 Clybourn Ave., Chicago 14, Ill.

WHEELER INSULATED WIRE CO.
378 Washington Ave., Bridgeport, Conn.

"HANG THE SKY".. for better lighting results

...for you and your customers



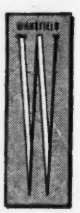
..you can do it with

Over-ALL Lighting

by Wakefield

Ideal for This picture suggests a new aim for you in lighting interiors—to "hang the sky" for smooth, even, diffused lighting in OFFICE, STORE, DRAFTING ROOM or SCHOOL. To create lighting as pleasing and comfortable for eyes as nature's sky. That means engineered lighting . . . Over-ALL lighting by Wakefield!

You can achieve it with any Wakefield lighting equipment . . . for Over-ALL lighting is based on "seeing" results. And the Wakefield line is engineered for top lighting performance, efficient service. Incidentally you'll find that the new Wakefield lighting equipment will have it *over* all others for sturdy construction, for ease of installation (with completely interchangeable parts) and for ease of servicing and maintenance . . . to help your customers get and *keep* full lighting value. Get the details on Over-ALL lighting from your local Wakefield representative. Or write for a copy of our new catalog No. 46. The F. W. Wakefield Brass Company, Vermilion, Ohio.



Wakefield

LIGHTING EQUIPMENT FOR OFFICE, STORE, SCHOOL, DRAFTING ROOM

IT'S BRAND NEW . . . THE WAKEFIELD STAR

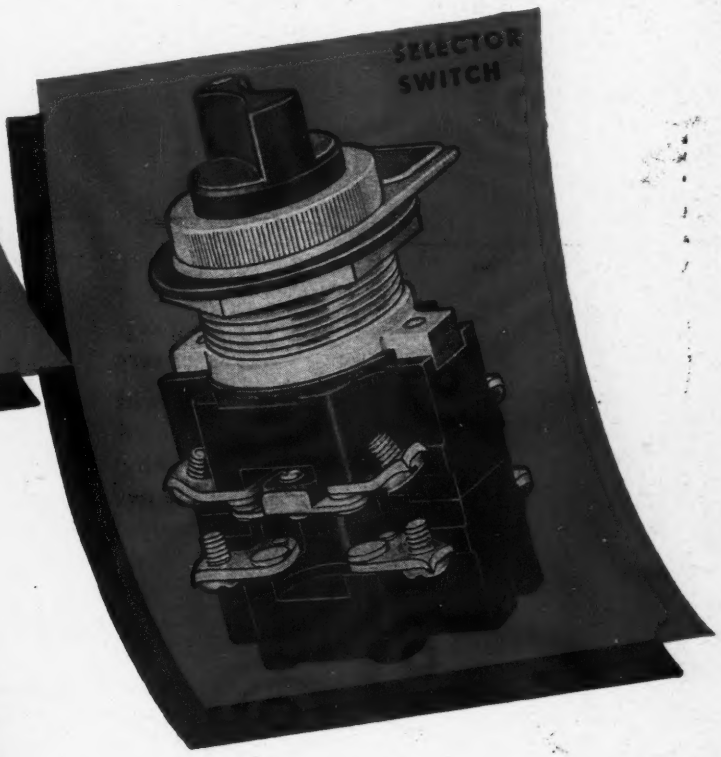
Combines fluorescent and indirect light. Pre-tested to give extra assurance of good lighting, sturdy construction, easy maintenance. Plaskon reflector shield slides out like a drawer, for easy cleaning. Specify the STAR . . . with planned lighting maintenance.

The General · The Grenadier · The Commodore · The Beacon

Another "3C" Achievement!

PERMANENTLY OIL TIGHT PUSH BUTTON, PILOT LIGHTS *and* SELECTOR SWITCHES *for use on Machine Tools*

Now you can avoid fouling contacts from seepage of oil or cutting compounds with these new "3C" developed Push Button Elements, Pilot Lights and Selector Switches that are *entirely oil tight.* A steel faced oil-tight washer is held snugly against both front and rear of the panel by close fitting nuts. An oil-tight boot closely grips the button, effectively sealing it against leakage.



These heavy-duty Type DO units have the same basic elements as the "3C" Type "D" units which have established such excellent records in heavy-duty use. Push Buttons and Selector Switches feature Silver-to-Silver Double Break Contacts. All units have large, easily accessible terminals that simplify wiring. Selector Switch permits 2 or 3 position operation. Vertical mounting is standard, but all units are adaptable to horizontal mounting. Mushroom head available for Push Button. Color caps for Pilot Lights are available in Red, Green, Amber, Blue, Clear and White.

Write for full information.

THE CLARK CONTROLLER CO.

1146 EAST 152nd ST., CLEVELAND 10, OHIO • EVERYTHING UNDER CONTROL

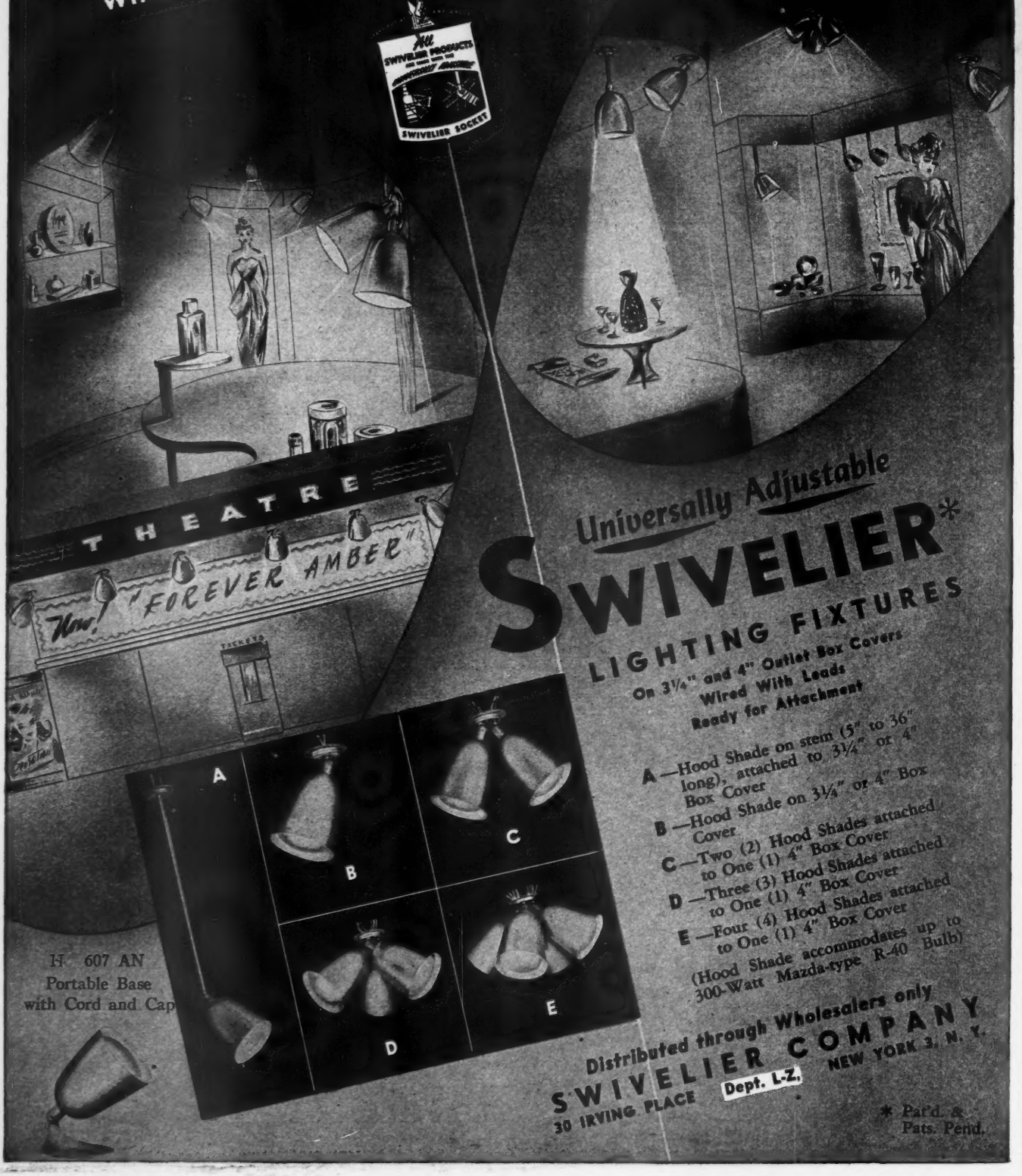
Accent

HIGHLIGHTS MERCHANDISE for WINDOW DISPLAYS

LIGHTING

CREATES IMPULSE BUYING in INTERIOR DISPLAYS

All SWIVELIER PRODUCTS are made with the exclusive SWIVELIER SOCKET



H 607 AN
Portable Base
with Cord and Cap

Universally Adjustable

SWIVELIER*

LIGHTING FIXTURES

On 3¼" and 4" Outlet Box Covers
Wired With Leads
Ready for Attachment

A—Hood Shade on stem (5" to 36" long), attached to 3¼" or 4" Box Cover

B—Hood Shade on 3¼" or 4" Box Cover

C—Two (2) Hood Shades attached to One (1) 4" Box Cover

D—Three (3) Hood Shades attached to One (1) 4" Box Cover

E—Four (4) Hood Shades attached to One (1) 4" Box Cover

(Hood Shade accommodates up to 300-Watt Mazda-type R-40 Bulb)

Distributed through Wholesalers only

SWIVELIER COMPANY
30 IRVING PLACE Dept. L-Z. NEW YORK 3, N. Y.

* Pat'd. & Pats. Pend.

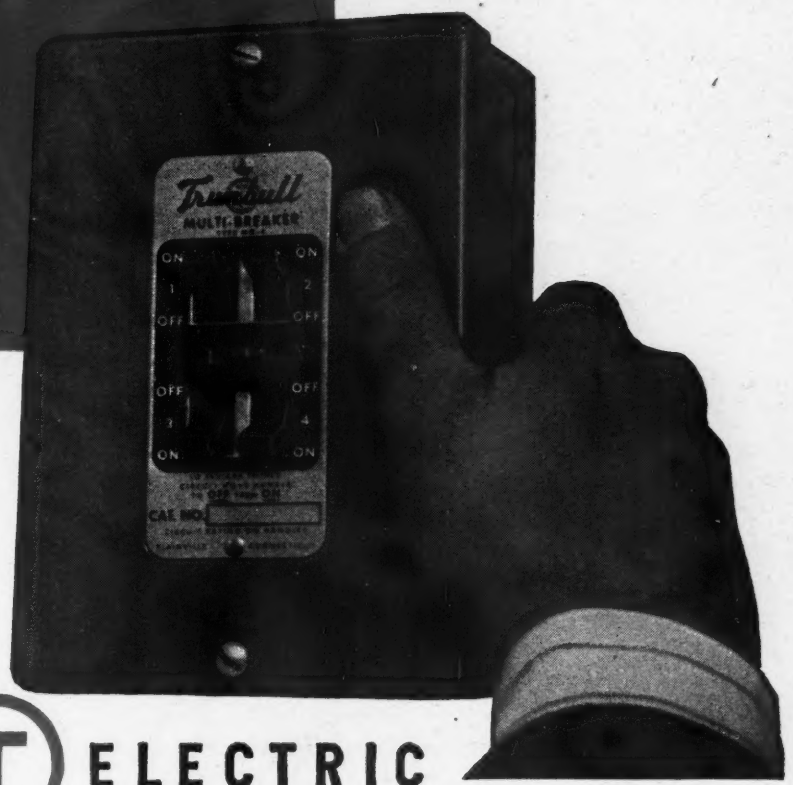
NEW

..TO THE ELECTRICAL INDUSTRY
..IN *Speed* OF TRIPPING
..IN COMPACT..STREAMLINE DESIGN

Magnetic *Plus* Thermal Branch Circuit Protection

Low Cost Circuit Breaker Operation

30 Ampere . . . for New Code Wire Ratings (Nov. 1-1946)



TRUMBULL (T) ELECTRIC

MO-4 MULTIBREAKER

Four Circuits----- or less

Countless thousands of locations require a sentry to guard 4 single phase circuits or less . . . for which duty Trumbull recommends the MO-4 Multibreaker . . . NEW to the Electrical Industry . . . an improvement of the MO-2, tested during war years in million of circuits.

It is low in cost yet has both automatic overcurrent and short circuit protection for branch circuits, in the form of a Circuit Breaker with combined thermal and magnetic characteristics . . . for the greatest speed in tripping.

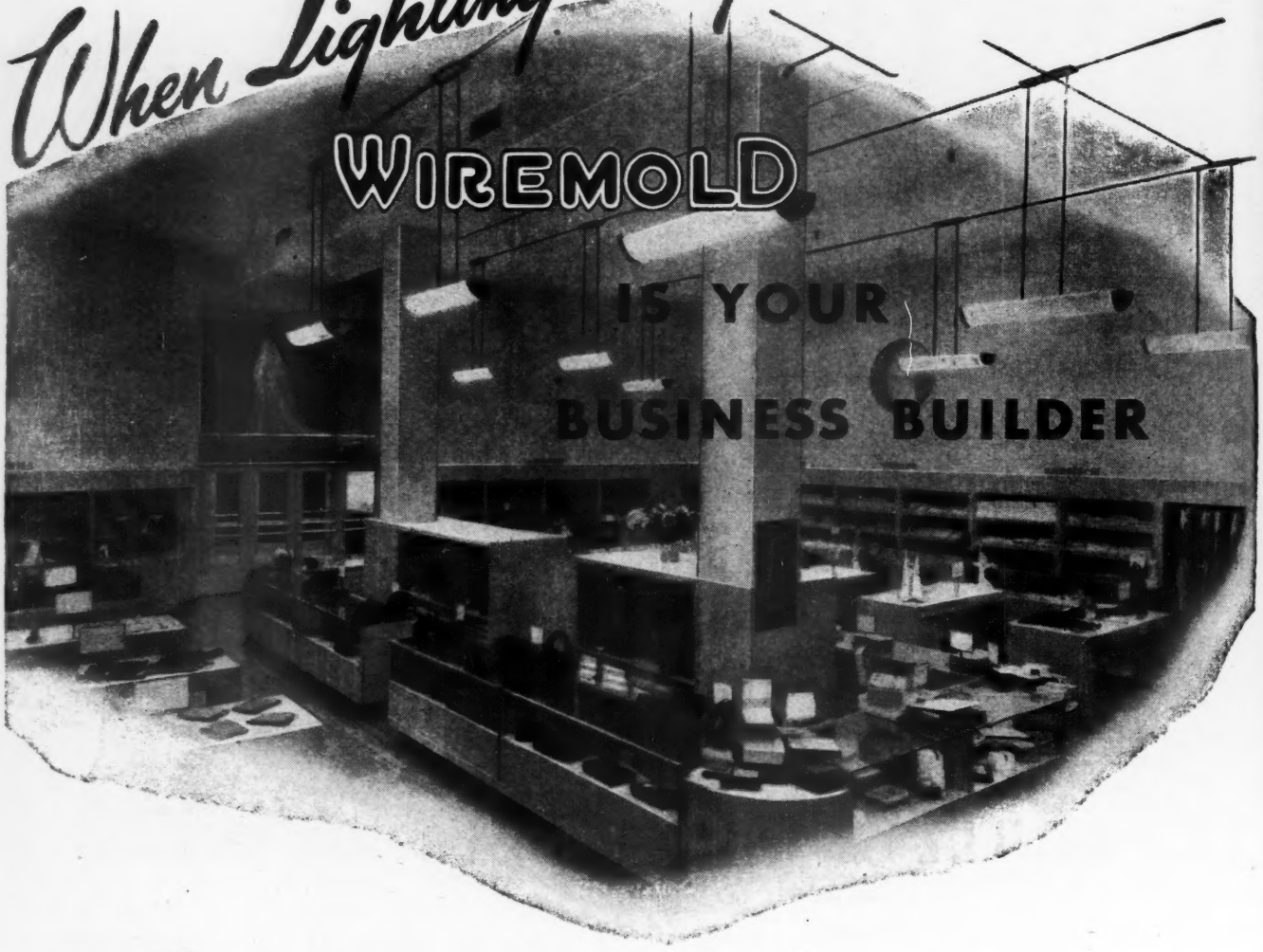
The MO-4 has a wide range of application in homes, garages, apartments, small stores, and is ideal for camp and farm installations. Specify or order this NEW TRUMBULL MO-4.

IN PRODUCTION NOV. 1 . . . ORDER NOW!

THE TRUMBULL ELECTRIC MANUFACTURING CO. • PLAINVILLE, CONN.

OTHER FACTORIES AT NORWOOD, OHIO • LOS ANGELES • SAN FRANCISCO • SEATTLE

When Lighting is your business.



- *with*

  the BASIC Wiring Systems that *create* lighting sales opportunities.

- *with*

  the Fittings and Wired Units that meet a wide range of lighting needs.

- *with*

  the comprehensive and cooperative Engineering and Data Sheet Services that help electrical contractors to develop the important lighting business potentials now existing in every territory.

The Wiremold Holecutting Tool which adapts all standard canopies to Wiremold raceway is available on loan. Write for details.

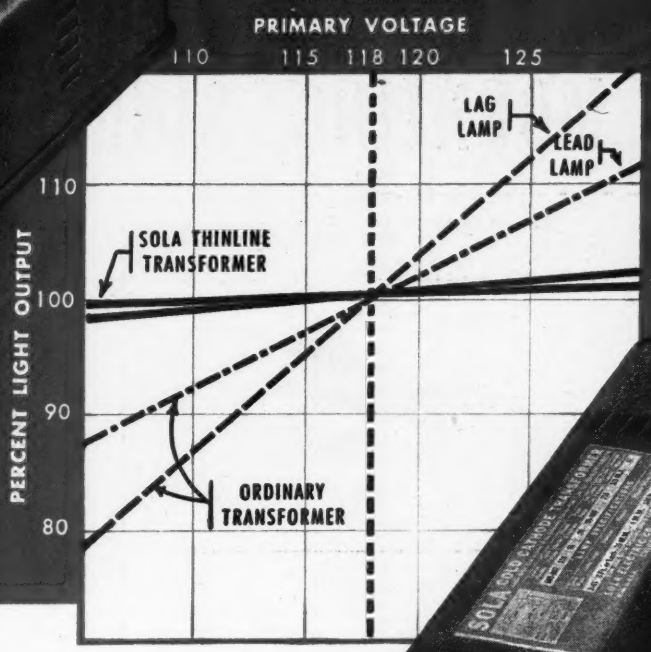
THE WIREMOLD COMPANY
Hartford 10, Conn.

WIREMOLD it! *For Profit and Customer Satisfaction.*

Sold through Wholesalers, installed by Contractors everywhere.

CONSTANT LIGHT OUTPUT

from the long, slim fluorescent lamps



SOLA engineers have smoothed many of the rough spots on the long, rocky road that fluorescent lighting has traveled to reach the number 1 spot in public preference.

You've heard it said many times, and we repeat it again—"fluorescent lamp performance is only as good as its source of power—the transformer."

In designing these transformers for the operation of the long, slim fluorescent lamps SOLA engineers have incorporated the SOLA Constant Voltage principle, thus making it possible to maintain *Constant Light Output* from the lamps at all times regardless of wide variations in supply line voltage. Compare these transformers with any other make. Merely vary the primary voltage and read the confirmation on the light meter.

For cool, quiet operation specify SOLA transformers for every lighting installation. They are available in both single and 2-lamp types, housed in compact ventilated cases.

SOLA *Lighting* **TRANSFORMERS**

Lighting Engineers
Complete information and specifications available on request—
Ask for Bulletin [**JFL-110** **JCC-107**

Transformers for: Constant Voltage • Cold Cathode Lighting • Mercury Lamps • Series Lighting • Fluorescent Lighting • X-Ray Equipment • Luminous Tube Signs Oil Burner Ignition • Radio • Power • Controls • Signal Systems • etc. **SOLA ELECTRIC COMPANY, 2525 Clybourn Avenue, Chicago 14, Illinois**

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SYLVANIA NEWS
CONTRACTOR EDITION

OCT. *Prepared by* SYLVANIA ELECTRIC PRODUCTS INC., Salem, Mass. 1946

NEW FIXTURE DESIGNS PERMIT SURFACE OR PENDANT MOUNTING, SINGLY OR IN ROWS

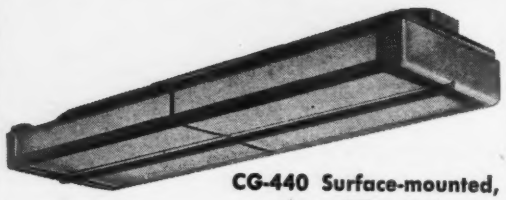
ONE FIXTURE—4 MOUNTING ARRANGEMENTS

FOR LOW, UNOBSTRUCTED CEILINGS

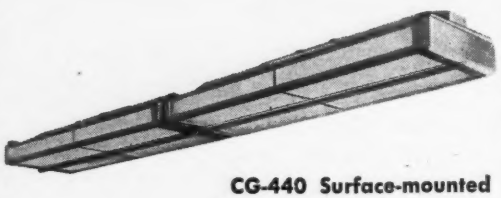
Direct-to-ceiling mounting is ideal where ceilings are relatively low and free from obstructions. Surface-mounted Sylvania fixtures may be arranged either individually or in continuous rows, depending on lighting requirements.

FOR HIGH OR OBSTRUCTED CEILINGS

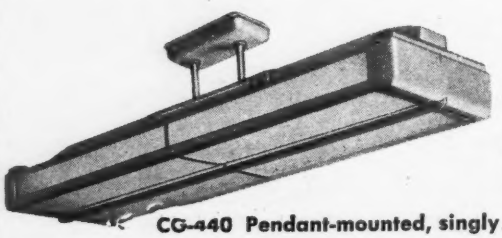
Pendant mounting of Sylvania fixtures assures uniform alignment, and permits clearance of ceiling obstructions. Pendant mounting is also adaptable to individual or continuous-row arrangements.



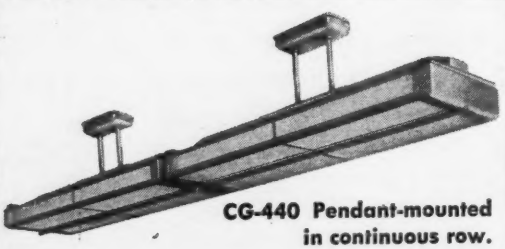
CG-440 Surface-mounted, glass diffused fixture.



CG-440 Surface-mounted in continuous row.



CG-440 Pendant-mounted, singly



CG-440 Pendant-mounted in continuous row.

Choice of Models Also Available to Meet Varied Lighting Needs

Among all the outstanding features of Sylvania Electric's new line of commercial fluorescent fixtures, contractors will find a special advantage in the ease of adaptability to different lighting requirements.

The new Sylvania fixtures are exceptionally flexible in their mounting arrangements. Every one of the 11 fixtures can be surface or pendant mounted, either singly or in continuous rows.

Moreover, the fixtures are grouped in "design families," each having one basic chassis style. This permits the use of unshielded, glass-shielded, and louver types within a single establishment, since all three types are designed to harmonize.

Both 2- and 4-lamp units of the "240" and "440" families can be used in combined mountings with the new Sylvania CP-150 spotlight fixture, to provide accent as well as general lighting.

Contractors will find this new Sylvania line easy to install, easy to maintain—and its durability and high quality will maintain customer goodwill and build repeat business. See your Sylvania distributor!

COMBINATIONS WITH SPOTLIGHTING, TOO

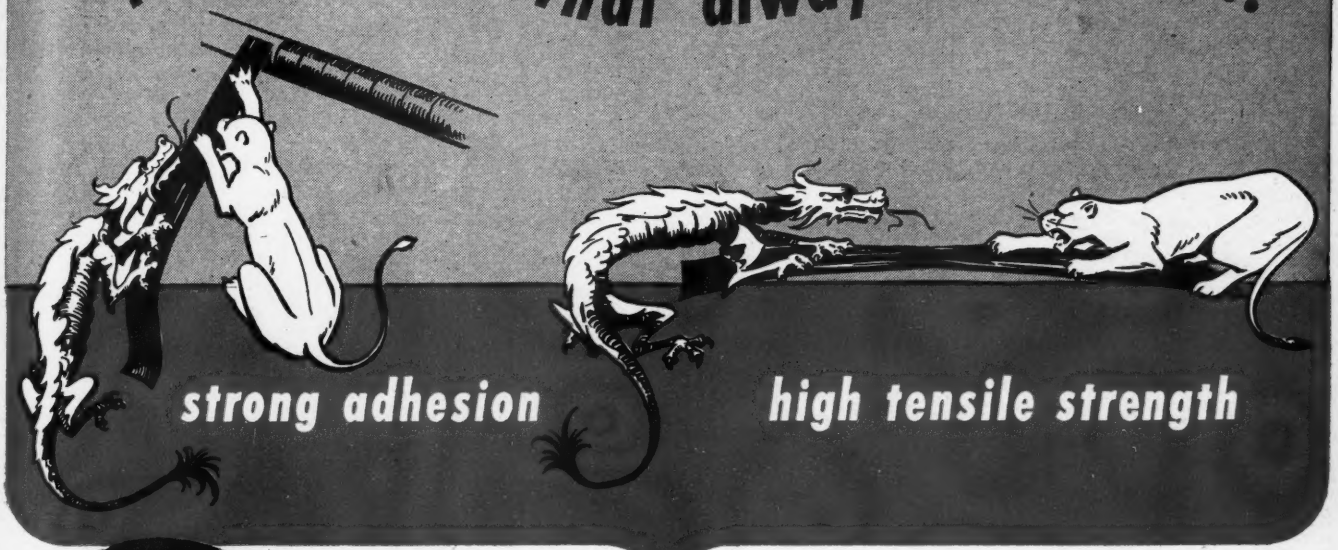
Two CG-440s surface-mounted with revolving spotlight between.

SYLVANIA ELECTRIC

MAKERS OF FLUORESCENT LAMPS, FIXTURES, WIRING DEVICES; ELECTRIC LIGHT BULBS; RADIO TUBES; CATHODE RAY TUBES; ELECTRONIC DEVICES

PANTHER and DRAGON
STAY WORKABLE LONGER!

they're tapes that always give you...



...and high dielectric strength

WHEN a tape buyer gets PANTHER or DRAGON, he's sure of good working qualities... qualities that comply with, and in many points exceed, current A.S.T.M. and government specifications.

PANTHER and DRAGON Friction and Rubber Tapes adhere securely, have high dielectric and tensile strength, make for neater, surer and longer-lasting splicing jobs. PANTHER and DRAGON Rubber Tapes have the additional quality of fusing securely.

PANTHER AND DRAGON
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Sold Through Recognized Independent Wholesalers

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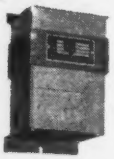
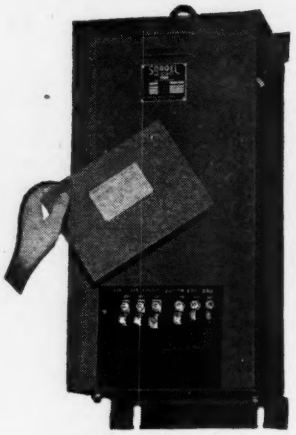
All PANTHER and DRAGON Tapes are sold only through recognized wholesalers.

SORGEL AIR-COOLED TRANSFORMERS



¼ KVA.
Single Phase
460/230 to
115 volt.



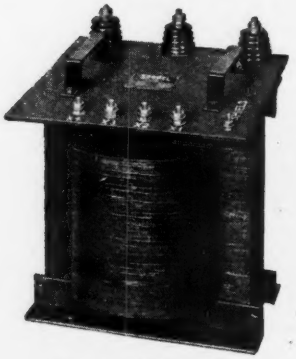
15 KVA. 3-phase
showing connection
compartment with
solderless terminals

for Every Purpose

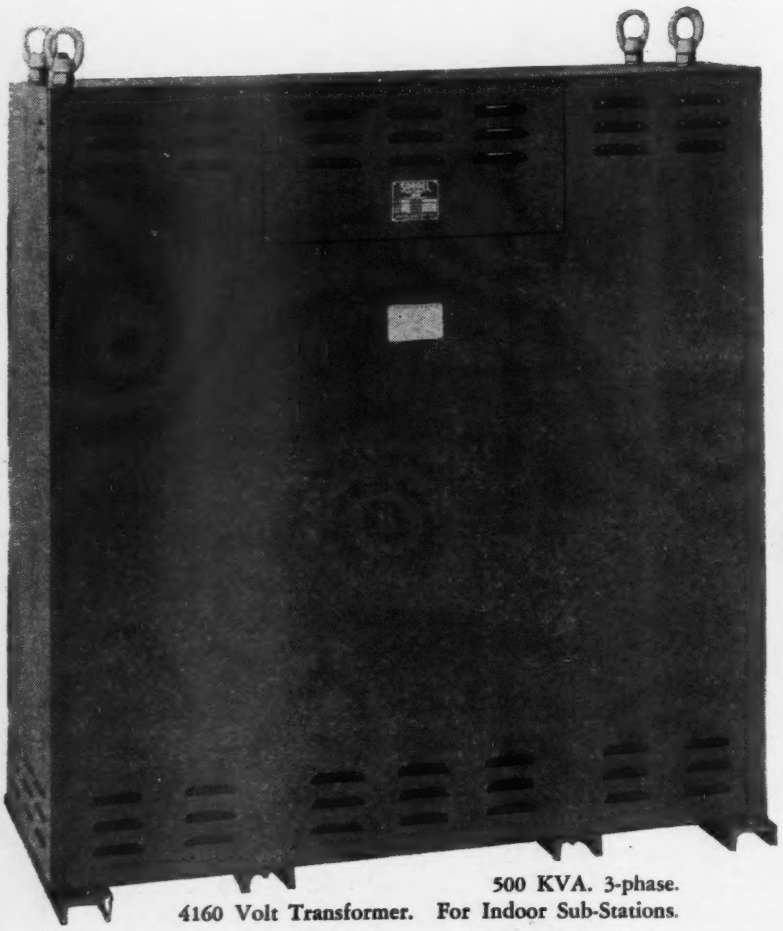
To operate 115 volt lighting and portable equipment from 230-460 or 575 volt power circuit.
¼ to 333 KVA. Single phase. 1 KVA to 1000 KVA. 3-phase.

To operate special equipment from standard circuits, to change odd voltages to standard voltages, and phase changing.

For interior high voltage distribution systems with transformers at load centers. Sizes up to 1000 KVA. Voltages up to 13,200.

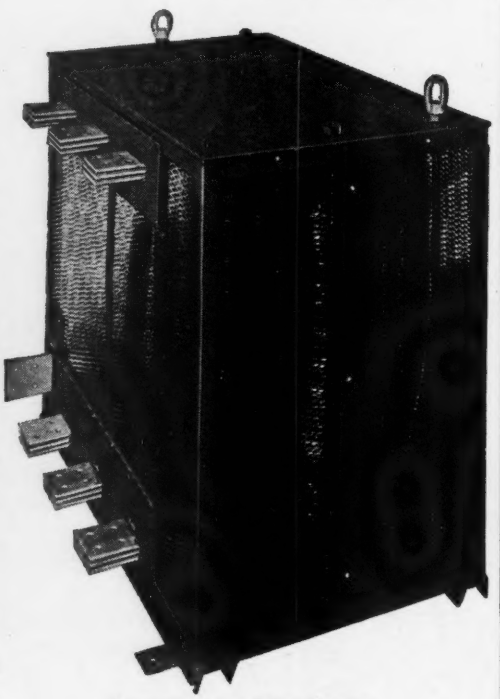


Special 4600 Volt
Electronic Transformer



4160 Volt Transformer.

500 KVA. 3-phase.
For Indoor Sub-Stations.



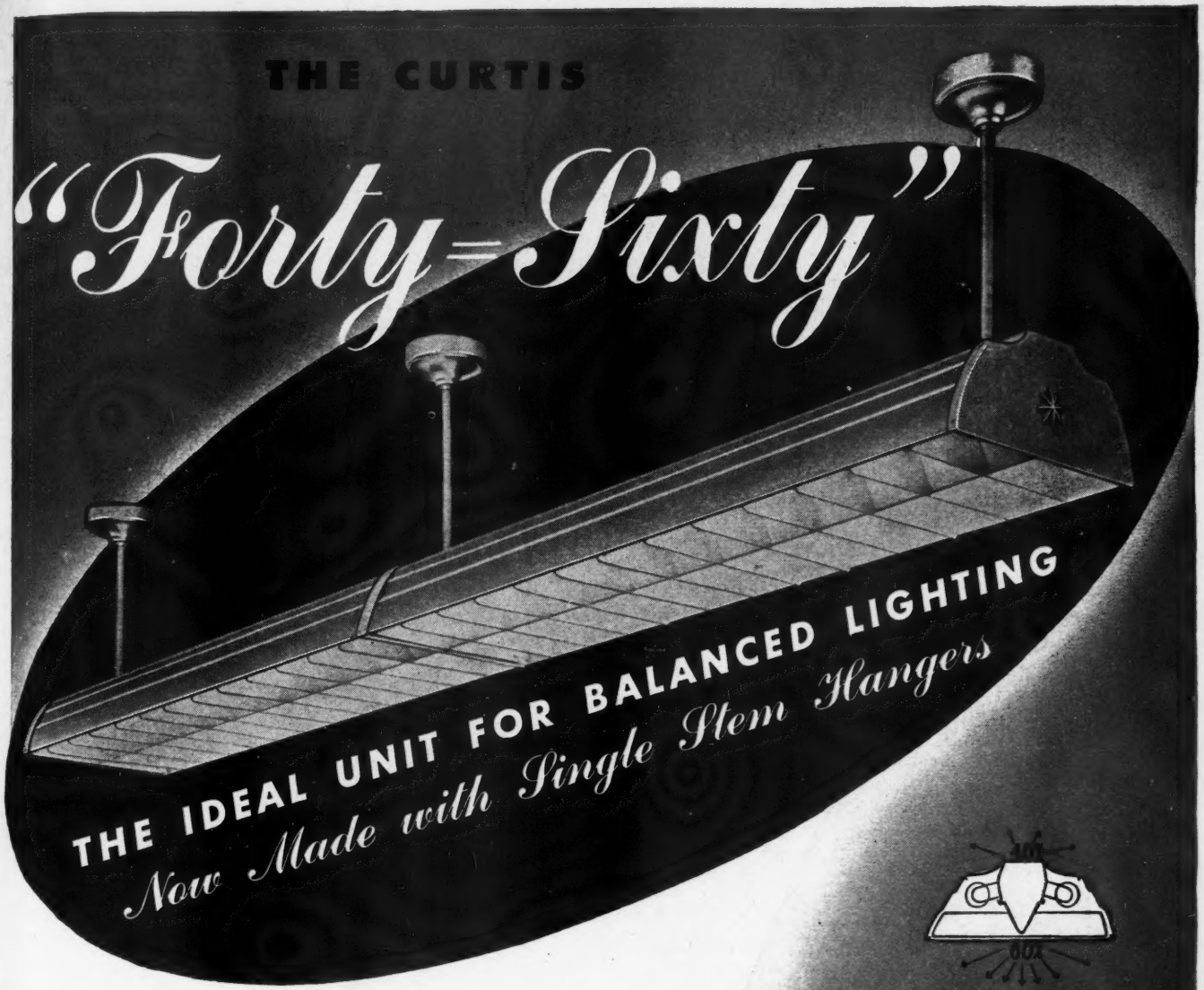
Booster Auto Transformer
1000 KVA. 3-phase. 208/120 to 240 volt.

SORGEL ELECTRIC CO., 836 W. National Ave., MILWAUKEE 4, Wis.

Pioneers in the development and manufacturing of Air-Cooled transformers.

THE CURTIS

"Forty-Sixty"



THE IDEAL UNIT FOR BALANCED LIGHTING

Now Made with Single Stem Hangers

Balanced lighting, producing efficient "seeing" conditions for the human eye is the keynote of more and more lighting specifications . . . today's demands are for ample light on the working surface *plus* sufficient room illumination with low brightness contrasts. That's the job the Curtis Forty-Sixty is designed to do—forty percent of its output is directed toward the ceiling where it is evenly diffused into the room . . . sixty percent is directed downward to the working surface . . . thus, comfortable efficient lighting is achieved for schoolroom, office or drafting room.

An Alzak Aluminum Unit, the Forty-Sixty is easy to keep clean because there are no horizontal surfaces to collect dust. Scientifically designed louvering shields the lamps from all ordinary angles of view.

The Forty-Sixty is now available with either single or double stem hangers for installation in continuous runs or as individual units. Get complete data on the Forty-Sixty . . . write for it today.

CURTIS

Lighting

INC.

6135 WEST 65th STREET

CHICAGO 38 • ILLINOIS

★★★★4 OF THE 1008 METROPOLITAN ELECTRICAL UNITS *in* RADIO CITY

COMPLETE ELECTRICAL CONTROL by

At the right are listed various types of electrical control equipment designed and furnished by METROPOLITAN for utilities, industrial plants, large mercantile establishments, and public buildings. Your inquiries are invited.

- Knife Switchboards
- Circuit Breaker Switchboards
- Dead Front Switchboards
- Battery Charging Switchboards
- Motor Control Switchboards
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- Laboratory and Test Switchboards
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ELECTRIC MANUFACTURING COMPANY

ELECTRIC LIGHTING AND POWER DISTRIBUTION EQUIPMENT

LONG ISLAND CITY 5, NEW YORK

These New Guth HY-LITERS

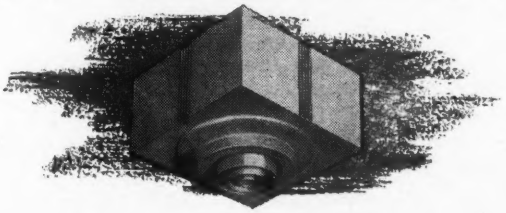
DRAMATIZE MERCHANDISE!

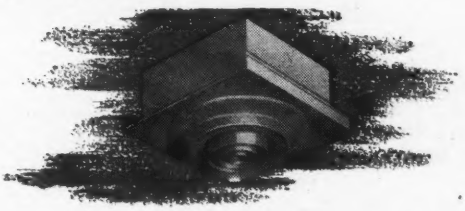
INTENSE SPOT-LIGHT AND FLOOD-LIGHT EFFECTS WORK MIRACLES WITH STORE DISPLAYS!..

GUTH HY-LITERS, using 150-watt Sealed Beam Projector Lamps, provide novel, effective "accent" lighting for stores! HY-LITERS, easily adjustable through a 90° arc for full concentration on merchandise displays or in show windows, bring dramatic emphasis to modern retail merchandising.

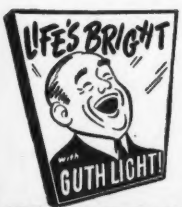
HY-LITERS' exterior portions are finished lustrous 300° WHITE Enamel, and surface types are attractively trimmed with polished Aluminum flutings.

They're beautifully fashioned—the last touch in good store lighting. Write today for more details.





Two Types Available for ACCENT Lighting!

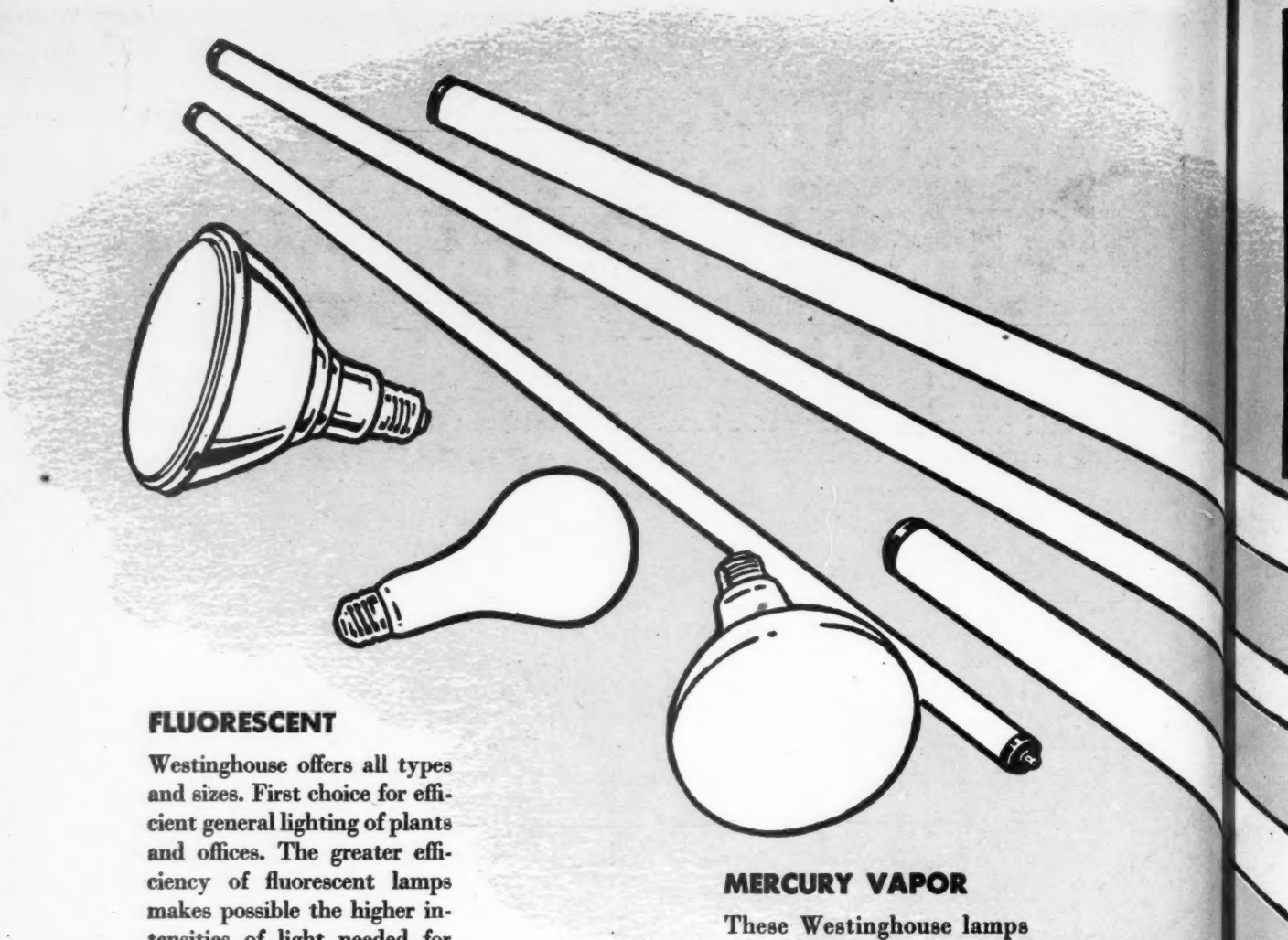


HY-LITERS may be had for either Surface or Recessed Mounting. Both types are suitable for use as individual units, or arranged in rows with GUTH FLUORESCENTS. HY-LITERS maintain the high engineering and construction standards of all GUTH Lighting Equipment, and are ideal for today's important ACCENT Lighting.

GUTH HY-LITERS *ARE AVAILABLE NOW!*

THE EDWIN F. GUTH CO. • 2615 WASHINGTON AVE • ST. LOUIS 3, MO.

Guth Leaders in LIGHTING SINCE 1902



FLUORESCENT

Westinghouse offers all types and sizes. First choice for efficient general lighting of plants and offices. The greater efficiency of fluorescent lamps makes possible the higher intensities of light needed for more productive working conditions.

INCANDESCENT

General service lamps up to 1500 watts serve most industrial applications. Westinghouse Projector and Reflector lamps are a simple, convenient means of supplying a directed or a spread beam of light where it is needed.

MERCURY VAPOR

These Westinghouse lamps are excellent for general plant lighting when the lamps must be installed in high bays and for critical inspection where color distinction is not a factor. High light output per watt makes these lamps efficient to use.

INFRARED

Available in types and sizes up to 1000 watts, Westinghouse infrared lamps are proving to be the simple, convenient, and economical source of heat for many baking, drying, and heating processes today.

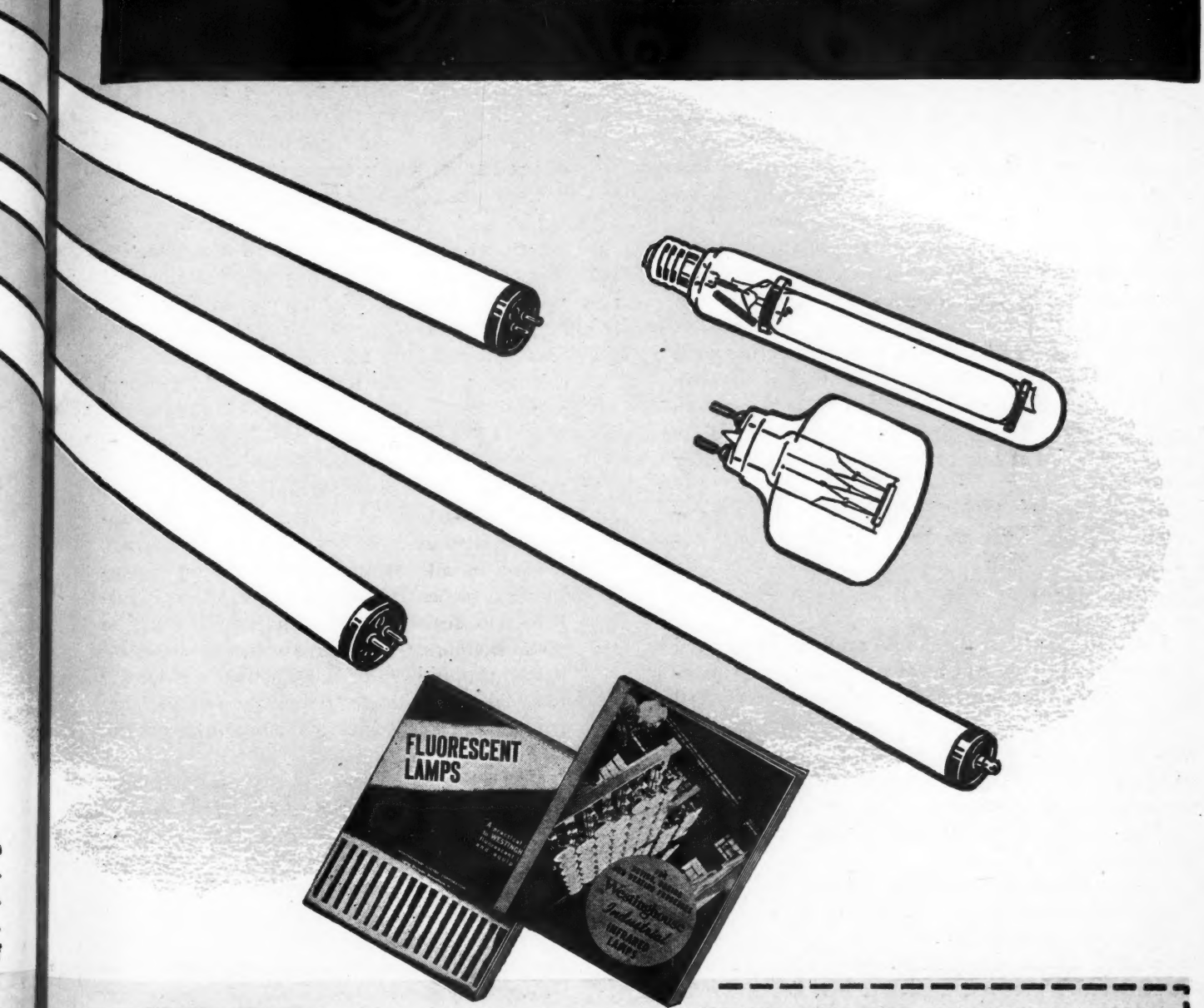
Westinghouse

PLANTS IN 25 CITIES OFFICES EVERYWHERE

LAMPS FOR SEE-ABILITY

Westinghouse Lamps

FOR EVERY INDUSTRIAL REQUIREMENT



FREE INFRARED AND FLUORESCENT LAMP BOOKLETS

Send today for either or both of these new information booklets. Check and mail the coupon below. Westinghouse Electric Corporation, Lamp Division, Bloomfield, N. J.

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EC-10

A FREE ECONOMY IS WORTH FIGHTING FOR

BUSINESS must take the initiative if the price decontrol machinery, set up by Congress, is to be effective. The present price control law is far more than a set of instructions to the administrators of OPA; it is a challenge to business to be aggressive in speeding decontrol decisions and in persuading the Price Decontrol Board to adopt a strong stand for return to a free economy.

Thus far business has not met this challenge. *Two months after the passage of the new price law not a single application for decontrol of a major product had been filed by an industry advisory committee.* This is due in part to the red tape controlling such applications. Nonetheless, a continuation of such inactivity on the part of business can well result in perpetuating price control far beyond the time either the present law or sensible economic policy require.

It was the clear intent of Congress to hasten our return to a free economy. In the legislation continuing the general control of prices, Congress formally declared its purpose to have it "terminated as rapidly as possible."

To accomplish this, the House originally approved a formula which would have made decontrol mandatory when production had attained a prescribed level. The automatic decontrol provision was dropped before the bill was finally passed, partly because of the uncertain effects of strikes on production. But Congress did not mean to return the timing and extent of decontrol to the administrative discretion of OPA.

On the contrary, to assure having price control "terminated as rapidly as possible," Congress created a Price Decontrol Board and gave it power to overrule OPA when the board finds price control should be removed. Moreover, it gave to industry the right and the responsibility to seek decontrol. Also, in a further effort to speed up the decontrol process, it placed narrow limits on the time allowed for board decisions.

Congress had compelling economic reasons for doing its legislative best to speed up decontrol.

1. It is by all odds the best way to eliminate the bottlenecks in production and the black markets which have plagued the country since V-J Day.

   Rigid price ceilings promote shortages of badly needed commodities by discouraging their production. Such shortages both upset the flow of production and promote black markets. At present a considerable part of American industry is stymied by shortage of critical parts and materials. Price control is much to blame.

2. There must be flexibility of prices if a round of new wage adjustments, which may be forced on industry early in 1947, is to be negotiated without grave risks of seriously curtailing production.

   When, under the leadership of the national administration, the first post V-J Day round of wage adjustments was made, price ceilings were held rigid while wages were boosted. The result was a series of price-wage squeezes which upset production. They would have been disastrous if we had not been in a sellers' market, created by a tremendous accumulation of wartime shortages. In 1947, however, many industries will be in a buyers' market. It must be possible, therefore, to have wage increases reflected promptly in price adjustments if we are to avoid a repetition of the costly post V-J Day round of strikes, which often had price control as the key issue.

3. Rapid decontrol is necessary to maintain a high level of employment and production.

   Almost five years of price control inevitably twisted the factors of production and distribution far out of the equilibrium which would prevail in a free economy to which it is the clear purpose of the nation to return. Unless the return to a free economy is facilitated by a speedy and orderly decontrol, the jolt of an abrupt return to competition can be expected to upset employment and production seriously.

It's Up To Business

To encourage speed and boldness in decontrol, Congress provided for the reimposition of control over any prices which, after being released, might

get out of hand. The dangers of this sort are chronically exaggerated. During the 25-day period in July when there was no price control the Civilian Production Administration found that "manufacturers of finished industrial and consumer products have generally exhibited commendable restraint in increasing prices no more than increased costs."

All of this endeavor to speed up decontrol and expand its scope is likely to be futile, however, unless business furnishes the driving power for the machinery Congress provided. OPA certainly will not do it. Neither can the Decontrol Board be expected to go out and drum up cases.

The necessity for vigorous action by business in pressing for decontrol is increased by the fact that the general legislative standards to guide decisions by the Decontrol Board are vague. They must be clarified and sharpened by decisions in specific cases.

The main principle to guide the decontrol of non-agricultural products is that price ceilings shall be removed when supply is in approximate balance with demand. But what precisely does that mean? The meaning will become clear only through Decontrol Board decisions.

The same is true of the principle which makes automatic decontrol of a non-agricultural commodity contingent on whether or not it "is important to business costs or living costs." Business must press cases which will give specific meaning to those vague terms if decontrol is to get on apace.

Cards Are Stacked

At present the government has the cards pretty well stacked against rapid decontrol.

First, the key members of the staff of the Price Decontrol Board are holdovers from the Bowles regime which emphasized the importance of carrying on price control rather than speed in getting rid of it.

Second, in exercising his authority to prescribe regulations to govern petitions for decontrol, the OPA administrator has required excessively complicated statistical and economic data. Manufacturers who are sure they can convince any fair-minded board of the desirability of decontrolling certain of their products assert that they are blocked by statistical entanglements.

Third, OPA has discouraged business from moving immediately under one section of the law to speed decontrol. This section provides that products "not important in relation to business or living costs" may be freed from price ceilings immediately and must be freed by December 31, 1946, unles OPA specifically finds they are important to these costs. Instead of making it possible for business to move under this section now, OPA has issued rules which have the effect of blocking such a course until the end of the year.

In the light of obstacles such as these, it is not surprising that the record of decontrol to date is not impressive.

Decontrol Record

Since June 30 there has been a drop from about 70% to about 60% in the total value of products under price control. But most of the drop has been accounted for by food products, which Congress took the lead in decontrolling, and by industrial machinery which was being decontrolled when Congress acted. By far the larger part of manufactured consumer goods remains under control.

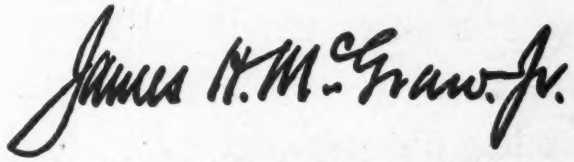
This, however, is no time for business to be discouraged. Rather, business should accept the obstacles put in its way as a challenge and work harder than ever for speedy decontrol.

The case for decontrol should not be stated in narrow technical terms. It should be based on grounds of broad public policy, and should demonstrate how a speedy return to a free economy can hasten the full release of the nation's productive power.

For example, there should be very clear demonstrations of how, in far too many cases, rigid price ceilings—(1) discourage production of key parts and materials by making such production relatively unprofitable, (2) create shortages of key parts and materials which tie up broad ranges of production or result in piling up lopsided inventories of partially completed goods, and (3) thus cut away the foundations of a stable economy and the prospects of steadily sustained employment.

There should be equally full demonstrations of the well known sequence from shortages to unrealistic price ceilings to black markets. Meat prices are rolled back, but the meat is rolled under the counter.

A free economy is worth fighting for. Liberty is preserved only by the constant struggle of those who believe in it. Neither the interests of the nation in a strong and well-balanced economy nor the interests of business itself will be served by drifting at this time. Now is the time for business to lead a strong offensive for speedy elimination of price control.



President McGraw-Hill Publishing Company, Inc.

THIS IS THE 51ST OF A SERIES

Standard TRANSFORMERS

Here are two STANDARD type AT, 450 KVA, 2400 volts, three phase, 60 cycle transformers . . . with high and low voltage terminal chambers, equipped with pot heads for cable connection.

ON THE JOB Standard Transformers offer

6

ADVANTAGES

- trouble-free performance
- safety
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- economical operation
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The life and dependability of your transformers depend upon the materials which go into their making. More than that, STANDARD transformers are engineered and built to fulfill special requirements of each job. They are available in capacities up to 10,000 KVA, self cooled, and voltage ratings up to 69,000 inclusive. These are the reasons STANDARD transformers dot the map of the United States in a dense pattern . . . serving industrial plants, municipalities, mines, and utilities everywhere. For complete information on engineering and construction features, write today. You will see quickly why STANDARD transformers are economical and dependable to own and operate.

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MAKERS OF POWER, DISTRIBUTION, INSTRUMENT, STREET LIGHTING AND TESTING TRANSFORMERS • • OIL, ASKAREL OR AIR COOLED

Offices in Principal Cities

OCTOBER . . . . *at a Glance*

Cover

The pattern of our cover this month is a photograph of the ceiling over the Security Council chamber of the temporary headquarters of the United Nations. The entire ceiling area consists of aluminum louvers which conceal the fluorescent lamps from direct view at normal angles of vision. Sections of the louvers are removable for servicing the lighting system. Louvers are 10 inches square, 6 inches deep, cover a total area of 11,000 square feet with 6200 feet of T 17 low brightness, 5 foot, 40 watt lamps, 4500 degrees white.

Power Strike

The Pittsburgh power strike has taught us the extent of our dependence on unfailing electric service. The extraordinary record of service continuity from utility lines has left even our most vital community institutions unprepared. Emergency systems in hospitals, theaters and similar institutions are suitable only for the momentary interruptions of storm or accident. They are desperately inadequate when community life must be sustained over a longer period. Vital services in every big city ought to be supplied by local stand-by sources of electric power and light capable of continuous operation. Water works, fire stations, hospitals, dairies and other establishments and services vital to community existence can be provided with stand-by equipment at a very moderate cost. And the initiative ought to come from the electrical contractors.

Standard Symbols

In the Specification issue last month the table of standard symbols on page 40 was intended to be those of the American Standards Association. The symbols of the American Institute of Architects was inadvertently substituted during the preparation. The A.S.A. symbols are preferred and will be published in an early issue.

Farm Wiring

Don't sell farm wiring short. The idea that farm electrification is a poor relation of the house wiring business has led to cheap jobs and inadequate services. As customers begin to explore the uses of electricity around the farm, they find their plans blocked by wiring systems designed for a few lights and a household refrigerator. So they look to gasoline powered machines, bottled gas heat and other alternatives for the chores that can and ought to be done electrically. One Midwest utility reports 280 farm customers with 20 kw. or more demand. The modern farmer is ready for specialized electrical utilization equipment. He can and will buy modern adequate wiring.

Done Before

A baseball scoreboard at Yankee Stadium has a device for indicating official decisions on hits or errors quickly and clearly. It was described in July *Electrical Contracting* on page 67 with the comment that it was believed to be the only one of its type anywhere. S. C. Sachs of St. Louis tells us that they designed and installed a similar system for Sportsman Park in St. Louis over six years ago, with the further refinement of remote control by the official scorer in the press box.

Relay Switching

It is unfortunate that much of the recent comment about relay switching with low voltage switch leads for house wiring stresses economy. A relay, low voltage wires and a good pushbutton, installed, costs substantially more than a conventional switch leg. The real advantage, and it is one of the most important opportunities ahead in residential wiring, is a whole new concept of control. Switching from several convenient points, master switching, switching from the desk or bedside becomes simple, economical and thoroughly practical. The idea isn't new, but the tremendous development of tiny, compact, reliable relays during the war ought to give us good cheap relays for outlet box or fixture canopy installation.

SO YOU WON'T BURN, HUH!

RESISTS FLAME

RESISTS MOISTURE

RESISTS ALKALIS

RESISTS GREASE

RESISTS ACIDS

Type T† for dry locations. Type TW† for moist locations. †New designations for Types SN and SNW.

FOR INSTALLATIONS in exposed places, confined spaces or use under normal conditions. Use Densheath. Its insulation offers many improvements over rubber. Durable. Smooth, polished finish. Pliant. Excellent superaging qualities. Good resistance to abrasion, tearing, bending, and flexing. Can be used anywhere Type R is allowed. Densheath provides economical service wherever installed. Anaconda Wire & Cable Company, Subsidiary of Anaconda Copper Mining Company, 25 Broadway, New York 4, N. Y. Sales Offices in Principal Cities. 46328

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TYPE T† & TW† BUILDING WIRE

TOWARD THE FUTURE

THE 1946 NECA CONVENTION will devote a good share of its agenda to "Protect Your Future," a particularly well chosen theme for right now. It would be difficult to find one more compelling or more urgent. Few industries have the potentials of ours in the years ahead. Few can look toward such clear opportunities.

THOSE OPPORTUNITIES are fairly evident. The upward course of electrical work as a percentage of the building dollar continues. In lighting, the sky is the limit. Power application forges ahead with no end in sight. Control is only beginning. Communication and signal work remains a relatively unexplored market.

SO DO WE DEVOTE several hours every week to planning and consolidating, to studying ways and means, to market analysis and lines of approach? Fill in your own answer. The amount of time the average electrical construction executive devotes to planning for the future today is microscopic. He is far too busy meeting the ever mounting problems of each day. He is looking for materials, he is meeting with labor, he is running jobs and negotiating contracts. He is handling a rising gross and fair profits at the expense of long hours and in the presence of maddening scarcities.

IT IS PERFECTLY CLEAR to most of the electrical industry today that sound wiring and competent electrical planning are the very essence of industry progress. Any move we want to make toward better wiring or better adequacy has clear sailing and hearty backing. "Relight America in ten years"—"One hundred footcandles or bust"—"Ten horsepower for every man, woman and child"—"Adequate wiring in every home"—whatever slogan or whatever program we want to foster there's plenty of help and strong support. And anything that helps any part of the electrical industry helps all of us.

WHAT IS THE ALTERNATIVE? Suppose we stay busy with today's problems, ignore the future, and trust our control of vital installation skills to channel work our way. Then we'll see bright horizons shrink and opportunities fade. Our segment of the industry occupies a strategic position along the main channel of progress. It must produce courage and leadership for the future or be by-passed. Because it cannot be by-passed, it may choke the avenues of electrical progress.

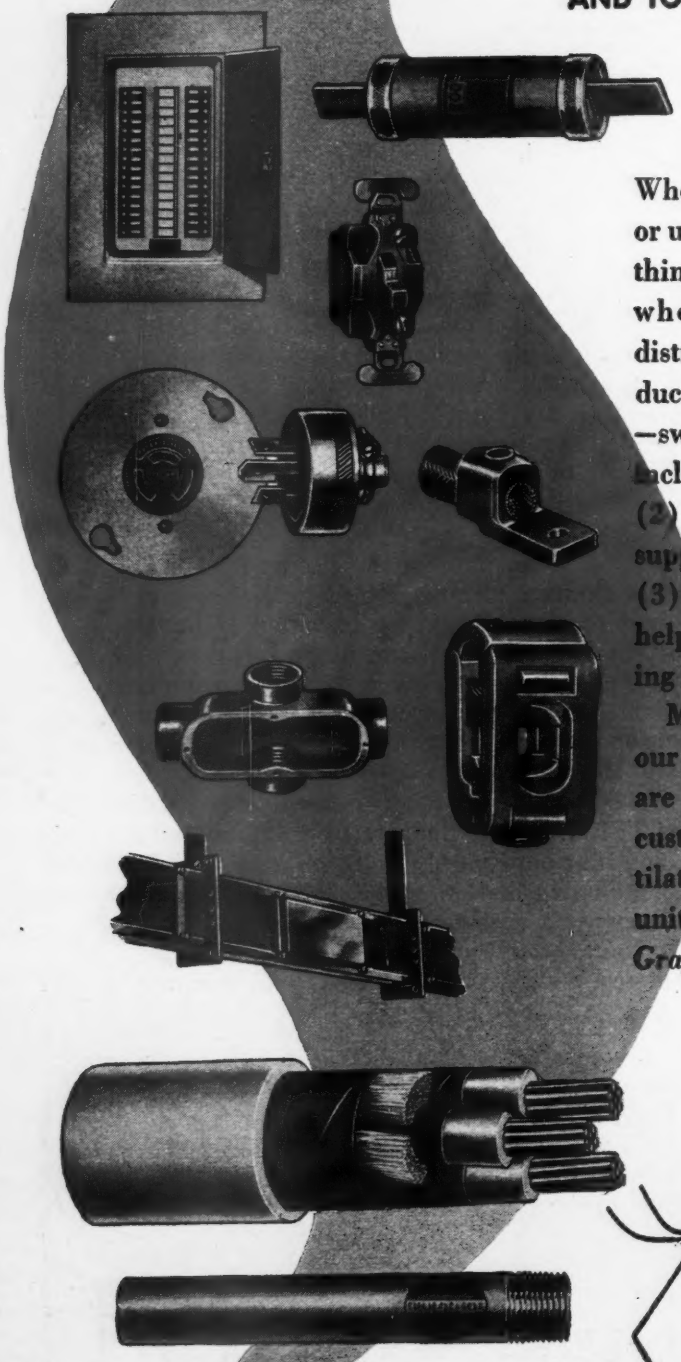
EVERY ONE of the opportunities mentioned above are logical objectives for contractor leadership. Every one could be the goal of a national, state-wide or local promotional effort toward better business in the future. But all are purely nebulous until we as an industry and as individuals get away from the day by day operational problems and down to the vitally serious business of planning our industry's future.

Wm. F. Stuart

Electrical Contracting—OCTOBER, 1946

Wiring

GRAYBAR DISTRIBUTES WIRE, CABLE, WIRING SUPPLIES AND TOOLS . . . OFFERS SPECIALIZED, LOCAL SERVICE



Whether the wiring will be indoors or outdoors—aerial or underground—you'll find Graybar can supply everything the job requires. Electrical contractors everywhere use our supply-service, because: (1) We distribute carefully-selected makes of wire, cable—busduct, conduit, raceways—connectors, insulators, sockets—switches, panels, fuses—everything else for wiring, including primary equipment and specialized tools. (2) We know wiring—all kinds—and are careful to supply items that properly complement each other. (3) The near-by Graybar Specialist is always ready to help in selecting materials and supplies for any wiring job.

Many electrical items are quickly available from our near-by warehouse. As currently unavailable items are produced, we'll be ready to help you meet all your customers' needs for wiring, power apparatus, ventilating equipment, lighting, tools, and communication units. *Graybar Electric Company. Executive offices: Graybar Building, New York 17, N. Y.* 4629

IN OVER 90 PRINCIPAL CITIES

ADEQUATE WIRING THE KEY TO THE HOME OF TOMORROW SERVES YOU WELL

Everything for Electrical Contractors via Graybar

R. L. Spring (left), president, Spring Electric Co., Canton, Ohio, discusses progress of the St. Francis Hotel rewiring project with his superintendent H. C. Hinds.

Rewiring is a stimulating business, according to R. L. Spring, who has several such projects on his books at present. It brings into play the engineering talent and construction "know-how" of the firm; it covers everything in the books—and then some. One fact is certain—only competent electrical contractors can, and should, do this type of work. If properly engineered, organized and supervised, projects of this type can be profitable.

Rewiring a Hotel

A case study in the wiring problems of hotel modernization. This Canton, Ohio project is typical of what contractors encounter.

By August Eckel

IN the market ahead there is going to be considerable rewiring of hotels and other commercial buildings. Unlike the clean cut, well designed and engineered wartime electrical construction, such rewiring projects are usually a challenge to the ingenuity of the electrical contractor. In many cases, like that illustrated here, the original wiring plans may not be available. Laborious tracing of circuits and load computations may be necessary before a well engineered system can be installed and solutions found for the inevitable problems that will be encountered.

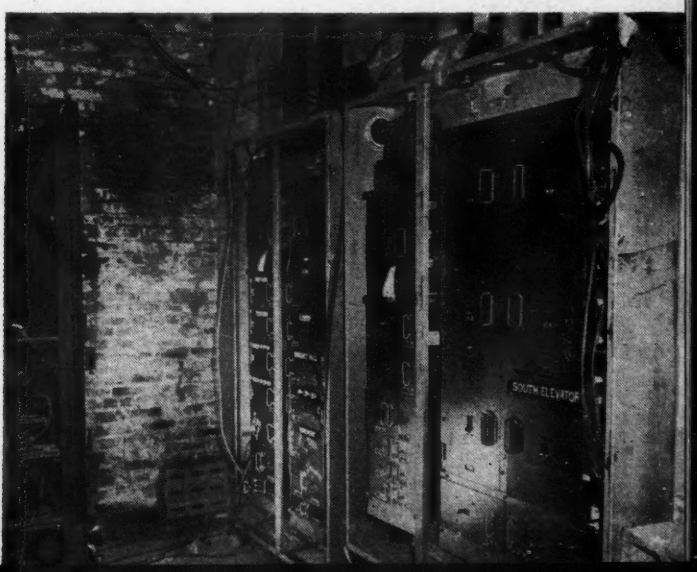
Whether a rewiring project should be handled on a "contract" or "cost plus" basis depends on numerous variables and local conditions on each specific job. Chances are that the latter method will prove most advantageous to both contractor and owner.

Typical of what the electrical contractor may expect in this rewiring market is illustrated in the experience of Spring Electric Co., Canton, Ohio. This firm, busy rewiring the 220-room St. Francis Hotel, formerly the Courtland, in that city, had to start from scratch (no original plans available) and engineer and install the new electrical system to the owner's specifications. The old hotel, built in 1906, was recently acquired by the management of the Onesto Hotel who ordered complete modernization of the building and its service facilities.

First problem Spring Electric en-

FIG. 1—Last two panels of the old six-section live-front main switchboard remain intact for temporary lighting and power service. New submetering panels are in rear of board.

FIG. 2—New dead-front distribution panels that replace old board in Fig. 1. Power panel in foreground, lighting in rear.



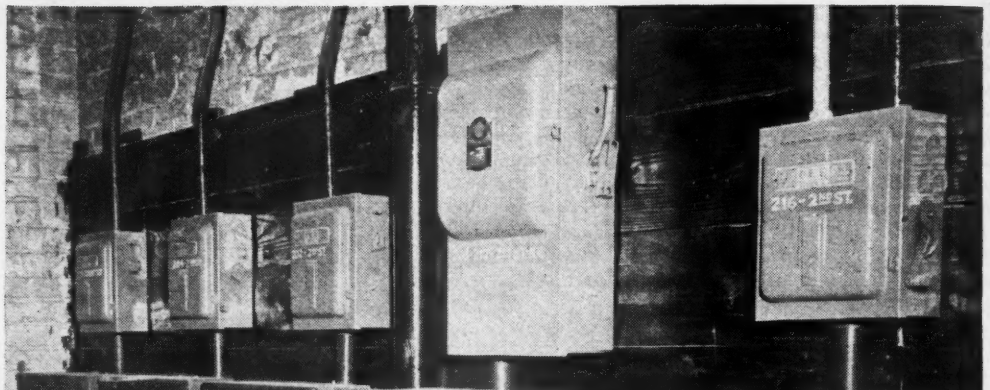
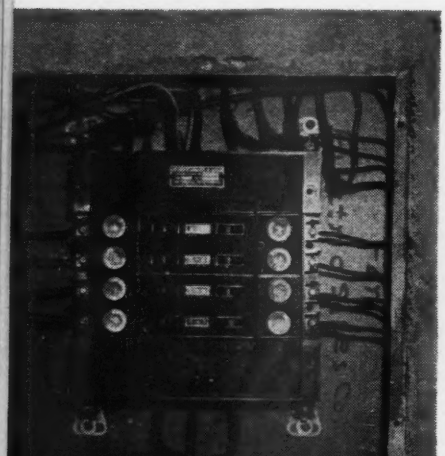
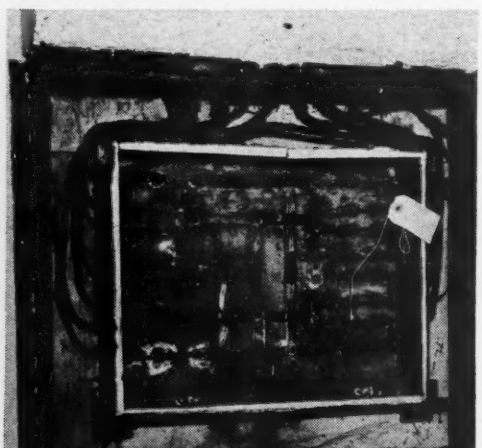


FIG. 3—Group of totally enclosed submetering panels to record individual score current consumption. Group is fed from a 400-ampere service.

Fig. 4—Old fuse-link lighting circuit panel (A) with open wiring branch circuits is replaced by modern plug-fuse panel (B) with conduit branches. Four wire feeder goes through panel to feed panels on other floors.

Fig. 5—Panel was scrapped; circuits cut and abandoned. Others, more economically located, replace this one.





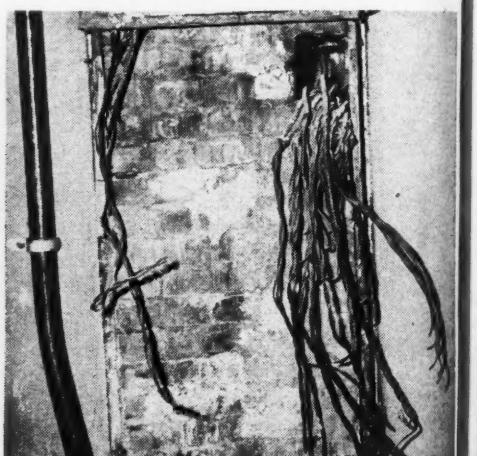
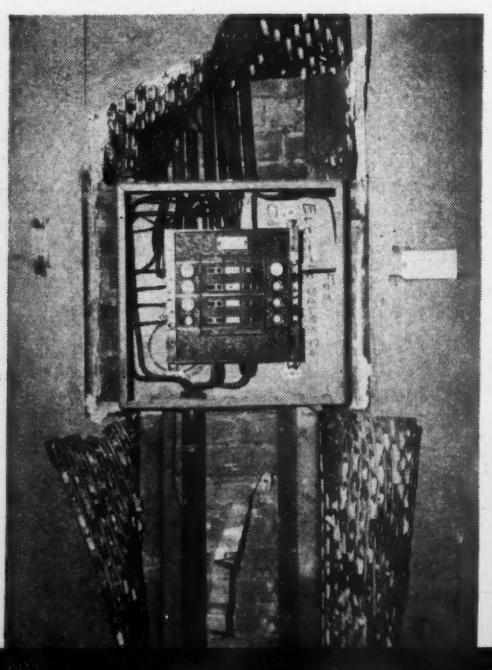
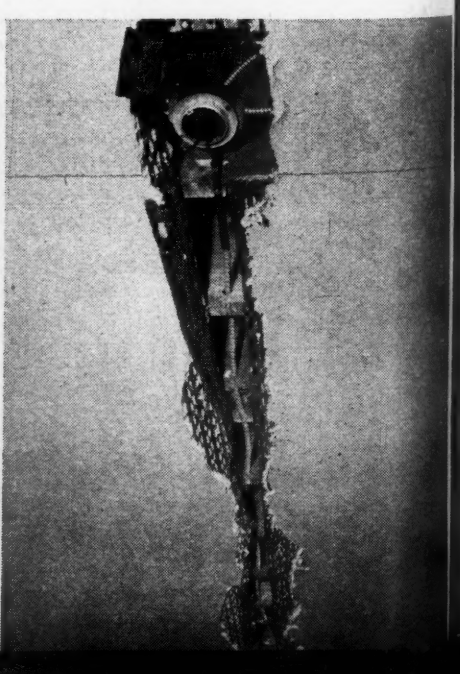


Fig. 6—Open wiring shaft, installed when building was erected in 1906, fed roof cornice lighting.

Fig. 7—Plaster was removed and metal lath peeled back for necessary access to install: (A) panel feeders and branch circuits; (B) switch leg for ceiling fixture.





countered was providing adequate capacity. The existing 600-ampere service was maintained, but a new 400-ampere was added to handle store requirements. Change from the former single-phase, 3-wire to the present 3-phase, 4-wire a-c system required new feeders. Now, four 400 MCM cables serve the stores; two 350 MCM cables per phase and one for the neutral serve the hotel load. New lighting subfeeders (four No. 4 conductors) were installed in existing conduits where feasible and replaced other wiring methods where encountered (Figs. 5 and 6). Project superintendent H. C. Hinds reported insulation on the old conductors was thoroughly "cooked" and fell off when pulled out.

New distribution equipment was also installed. The old free-standing live-front main switchboard (Fig. 1) gave way to modern wall-mounted, dead-front units (Fig. 2) while modern totally enclosed submetering panels (Fig. 3) record individual store current consumption. Numerous lighting circuit panels of 1906 vintage (Fig. 4A —typical 8-circuit, knife-switch, fuse-link panel) were replaced with modern units (Fig. 4B).

Wiring Methods

Branch circuit installations in the various rooms were a matter of relocating some outlets and adding others. Numerous wiring methods were encountered, as might be expected in a building where the electrical system was changed or expanded from time to time. Considerable conduit and armored cable were found. Some non-metallic sheathed cable circuits; and some original knob and tube wiring were uncovered.

According to specifications, each room will now contain a ceiling fixture with wall switch control; two or more convenience outlets (depending on room size); a fan outlet with wall switch control; closet light with door switch; bathroom light with wall switch and receptacle; also a telephone outlet.

For rewiring, Spring Electric used E.M.T. where feasible (particularly in new partitions); armored cable where "fishing" was necessary; and branch circuit extensions "in kind" where other methods could not be used. Access to existing circuits was effected by breaking out the plaster and bending back the metal lath (Fig. 7-A, B). Where the work was of a "clean cut" nature, thin wall conduit was used (Fig. 8-A, B, C). Surface extensions were used in a few rooms. Open wiring circuits were disconnected and abandoned. Where required, synthetic thin-wall insulated wire was used to increase branch conduit capacity.

Electrical plans call for recessed fluorescent lighting in the lobby, mezzanine, and street level stores; modern lighting in the ball rooms, dining rooms and large assembly rooms; photo-cell control of doors leading from the dining areas into the kitchen. A separate electrical service is planned to take care of the air conditioning load for the above public areas.

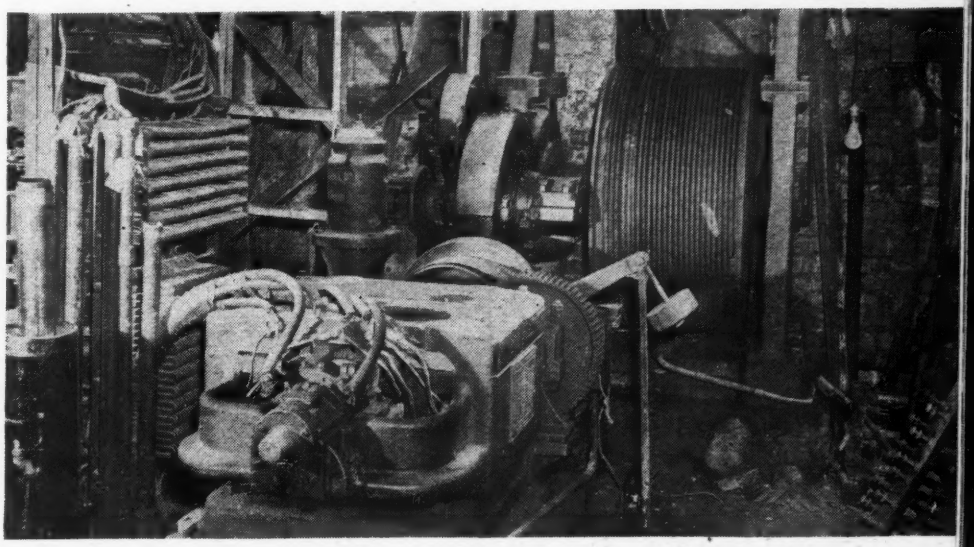
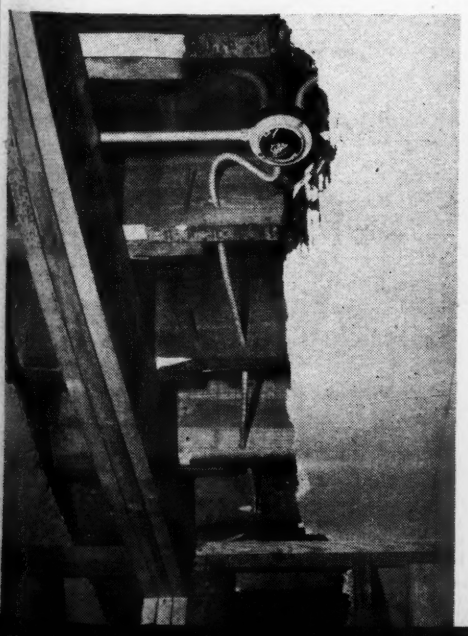
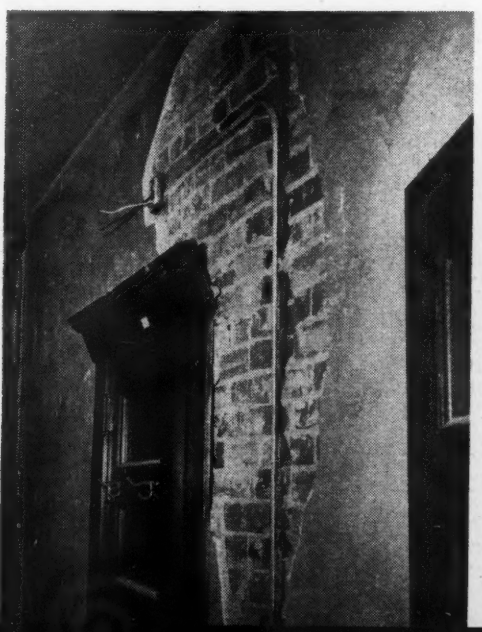
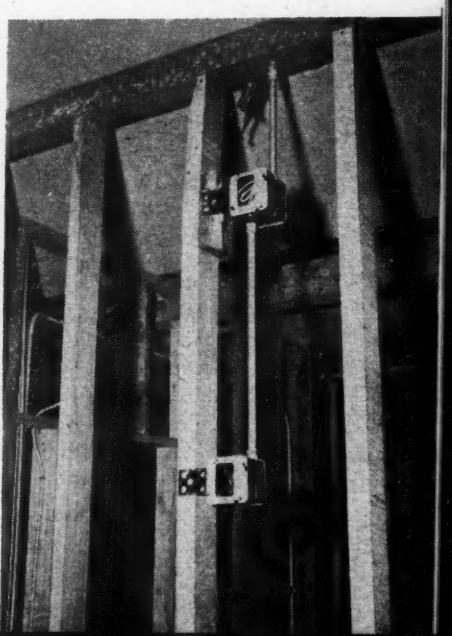


Fig. 9—Elevator equipment—1906 vintage—which is to be replaced with a modern alternating current drive. This d-c unit is now operated by a motor-generator set.

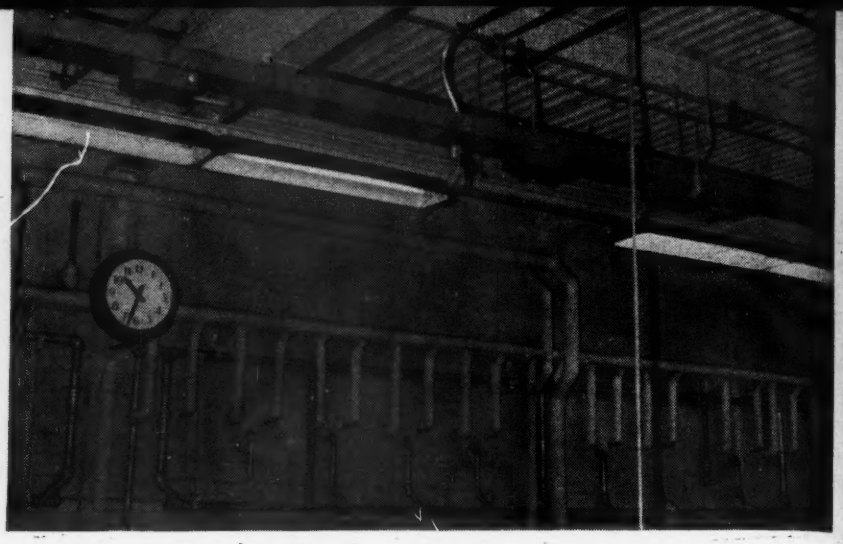
Fig. 8—Rewiring methods included: (A) E.M.T. and BX for ceiling outlet and switch leg; (B) E.M.T. extension from existing outlet to new fan outlet; (C) and thin-wall conduit extension for two fan and switch outlets, back-to-back. Open wiring circuits were disconnected and abandoned.



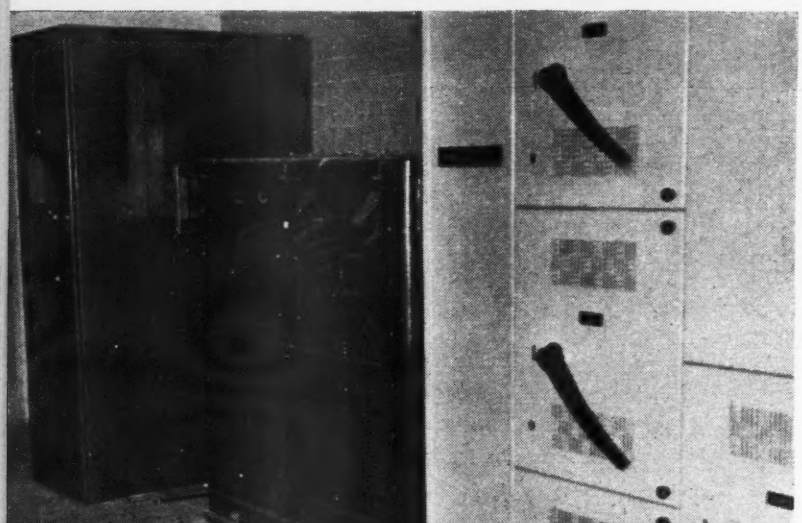




originally suspended beneath the roof-supporting I-beam structure. Closely spaced plug-in openings permit installation of short branch circuits between high current-carrying bus and operated equipment.



Low voltage 500 amp. bus duct was Each distributing substation consists of a 500 kva. transformer, natural air cooled, 75 degrees C. temperature rise at full load continuously. Fed by 2400 volt, 3 phase delta primaries, current is transformed to 208/120 volt wye secondary.



INSURED

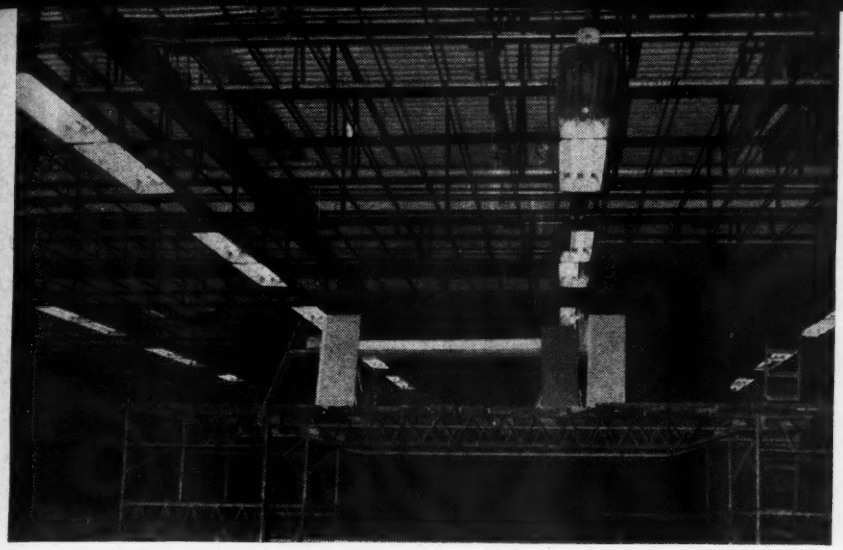
Flexibility of plug-in bus ways and reliability of multiple power feeders are combined in system serving new United Nations headquarters.

TO capitalize on the electrical and structural facilities of a modern industrial plant, the United Nations organization has transferred the locale of its interim headquarters from the crowded Hunter College gymnasium (EC May 1946) to a section of the huge 30-acre government owned plant at Lake Success, New York. Electrically served by four miles of 500 amp. copper bus with a total distribution capacity of 4,000 kw. and by an additional 100 miles of auxiliary wiring, the 600,000 square-foot floor area occupied by the U. N. is illuminated by over ten miles of fluorescent lamps and is air conditioned by modern electrostatic precipitron units. Six weeks of continuous labor and over $2,000,000 were expended in converting the plant to peace-time purposes. Over 45,000 man-hours were required to complete the extensive electrical alteration and installation program.

Distribution

The term "Security" not only designates one of the functional U. N. Councils but also describes the high voltage distribution system. Being favorably situated in respect to both of the main 70,000-volt Long Island utility power lines, the plant obtains primary current from two services. Three 7500 kva. outdoor substations operate from a cross-connected 600-amp. bus, transforming the power to 2400 volts and delivering it to a series of inter-connected 2000 amp. distributing busbars. Feeders from these secondary busses radiate to 500 kva. unit transformer substations located throughout the plant and, at these points, the current is again stepped down from 2400 volt, 3 phase delta to the utilization level of 208/120 volt wye. Manually operated disconnect switches provide means for connecting each 500 kva. substation to either one of two separate 2400 volt feeders. Since these feeders originate at different sections of the distribution bus, continuity of current to each substation can be insured. From primary 70,000 volt service to the final 208/120 volt level, the distribution system is protected against breakdown since the failure of a main line, an outdoor substation or a high voltage feeder can be by-passed by switching to an auxiliary circuit.

With the exception of the air compressors and pumps (deep well and fire) which are fed directly from the 2400 volt system, the plant is operated by 208/120 volt current distributed through parallel runs of 500 amp. plug-in bus duct spaced 40 feet center-to-center and suspended beneath the I-beam roof framework 16 feet above the floor level. Protection against bus overload is provided by air circuit breakers with switches set to open at from 50 to 100 amps. below capacity. The low voltage



In space planned for offices, suspended acoustical ceiling is framed around housings of original lighting fixtures. Lighting is controlled by electrically operated circuit breakers activated by conveniently-located remote-control pushbutton stations.

←

In locations where maximum headroom was required, bus duct was removed from beneath I-beams and reassembled in overhead monitors. Removal of access cover shows arrangement of 3 phase, 4 wire bus at splicing point. Plug-in opening and hole for neutral stab are protected by outlet cover when not in use.

↓

DISTRIBUTION

BY Hugh P. Scott

bus duct distribution system combines the advantages of high current-carrying capacity, reliability, flexibility and efficiency. With busses enclosed in prefabricated standardized metal housing, both electrical and mechanical protection is achieved. Closely spaced plug-in openings, safeguarded by outlet covers when not in use, permit the ready installation or disconnection of short branch feeders to motors, minimize voltage drop due to long runs and provide the means for rapid rearrangement of equipment.

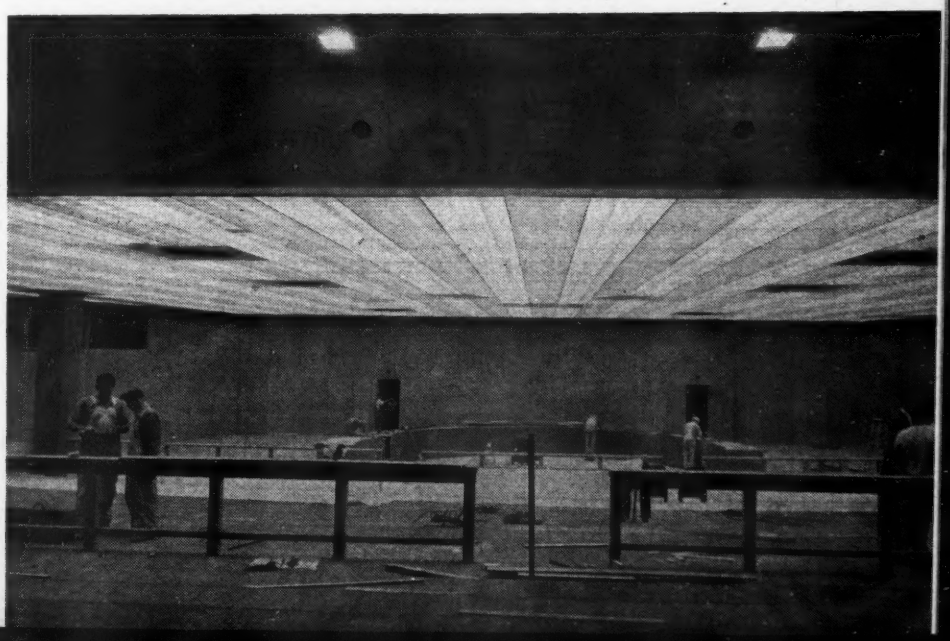
Circuits not operated directly from the bus system, such as those for lighting, are controlled by electrically operated circuit breakers located at the unit substations but activated by remote, conveniently situated pushbutton stations.

In adapting the space to meet the requirements of the United Nations, major structural and electrical alterations were necessitated. The huge floor area, formerly utilized for industrial machining and assembly work, was re-planned to include two 12,000 sq. ft. Council Chambers, four 5100 sq. ft. conference rooms, ten committee rooms averaging 800 sq. ft., housing and transportation bureaus, a First Aid station, thousand-seat dining room, office, bank and adequate office space to serve the personnel handling the voluminous business details of the organization.

These large-scale structural changes compelled the revamping of the distribution system. To secure maximum headroom in the area planned for the two Council Chambers, it was necessary to remove the entire suspended bus system, relocate the ducts in the overhead monitors, reassemble and rehang the busses in their new locations. In other areas the construction of suspended accoustical ceilings blocked access to the ducts from below and provisions had to be made for either rerouting the connected loads to allow the removal or discontinuance of some busses, relocating the ducts in an accessible location or constructing catwalks in the sealed overhead. In rehanging the busses, expansion joints were located every 150 to 200 feet to conform with corresponding joints in the building structure. The high

[Continued on page 176]

With bus duct raised to increase headroom, work on the Security Council chamber nears completion. In addition to re-engineering the distribution system, the electrical contractor installed special lighting units and a complete audio system. Openings in ceiling are for recessed floodlights, amplifiers and air-conditioning louvres.



DETROIT'S Reorganized Inspection

Detroit's electrical inspection department adopts a model organizational plan for better supervision, improved industry cooperation.

DETROIT'S newly reorganized electrical inspection department is geared to growing electrical utilization. Under the new setup, additional administrative personnel provides better supervision of field activities; more effort is being directed toward promotion of inspection's vital place in the electrical industry and better cooperation between city departments.

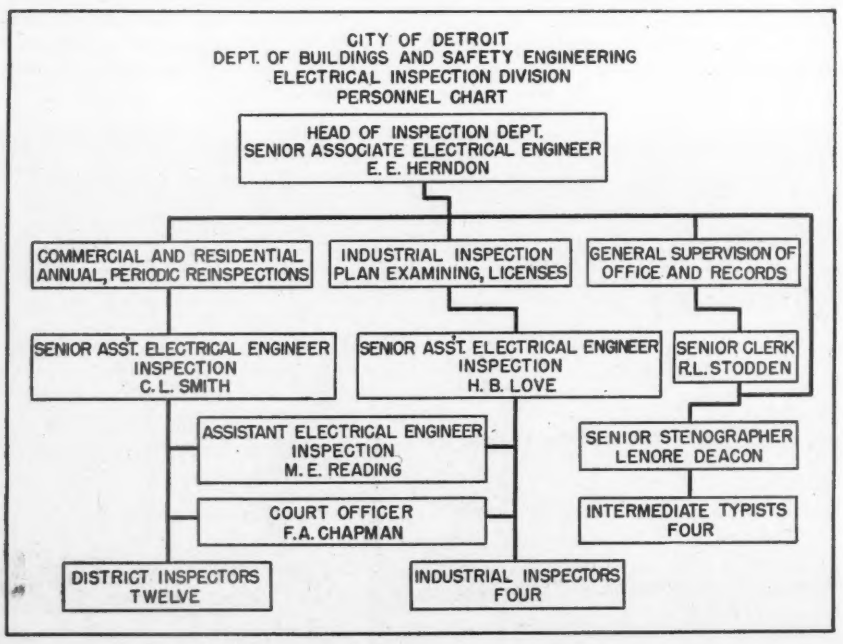
The previous system vested all administrative authority and responsibility in a chief and assistant chief inspector. Now senior associate electrical engineer E. E. Herndon heads the department; senior assistant electrical engineers C. L. Smith and H. B. Love supervise commercial-residential and industrial inspection activities respectively; an assistant electrical engineer works for both. Senior clerk R. L. Stodden supervises a clerical staff that handles office routine and records. To this administrative staff are added twelve district inspectors (commercial and residential) and four industrial inspectors. Plans call for possible addition of more industrial men at a later date.

All the administrative personnel are well qualified, and attain their positions through competitive Civil Service examinations. The associate electrical engineer, who heads the department, must have a registered professional engineer's rating.

The accompanying chart shows the new organization plan and the duties allocated to the administrative personnel. The plan is intended to provide clear lines of action and responsibility, especially for the problems of the post reconversion era.

Detroit has developed an effective solution to the ever-present question of an electrical inspector's responsi-

[Continued on page 172]


CITY OF DETROIT
DEPT. OF BUILDINGS AND SAFETY ENGINEERING
ELECTRICAL INSPECTION DIVISION
PERSONNEL CHART
HEAD OF INSPECTION DEPT.
SENIOR ASSOCIATE ELECTRICAL ENGINEER
E. E. HERNDON
COMMERCIAL AND RESIDENTIAL ANNUAL, PERIODIC REINSPECTIONS
INDUSTRIAL INSPECTION PLAN EXAMINING, LICENSES
GENERAL SUPERVISION OF OFFICE AND RECORDS
SENIOR ASS'T. ELECTRICAL ENGINEER INSPECTION C. L. SMITH
SENIOR ASS'T. ELECTRICAL ENGINEER INSPECTION H. B. LOVE
SENIOR CLERK R.L. STODDEN
ASSISTANT ELECTRICAL ENGINEER INSPECTION M. E. READING
COURT OFFICER F.A. CHAPMAN
SENIOR STENOGRAPHER LENORE DEACON
INTERMEDIATE TYPISTS FOUR
DISTRICT INSPECTORS TWELVE
INDUSTRIAL INSPECTORS FOUR

CITY OF DETROIT

Dept. of Buildings and Safety Engineering
Electrical Inspection Division

Administrative Personnel

SENIOR ASSOC. ELECTRICAL ENGINEER
(Head of Bureau)
Establish administrative policy & procedure.
Formulate rules and regulations for new apparatus.
Render code interpretations; make all decisions where code does not apply.
Conduct tests of new equipment.
Supervise trial installations of new material.
Edit Bureau Bulletins and review all reports.
Prepare examinations for electrical journeyman and contractors; serve as chairman of Electrical Examining Board.
Prepare Annual Budget and Report.
Maintain general supervision of Bureau.

SENIOR ASS'T ELECTRICAL ENGINEER
(Commercial-Residential)
General supervision of commercial and residential district inspectors.
Establish inspection districts and inspection procedure.
Make periodic check of field inspections.
Submit recommendations for code revisions or new requirements.
Check daily inspection reports.
Submit monthly report to Senior Associate Electrical Engineer.

SENIOR ASS'T ELECTRICAL ENGINEER
(Industrial)
General supervision of industrial inspectors.
Establish industrial inspection districts and inspection procedure.
Make periodic check of field inspections.
Submit recommendations for code and rules revisions.
Check daily inspection reports.
Check plans and specifications for comformity to code requirements.
Review inspection reports and approve violations.
Conduct examinations for electrical journeymen and contractors.
Represent Bureau with Architects on preparation of plans and specifications.

ASSISTANT ELECTRICAL ENGINEER
Assist both Senior and Assistant Electrical Engineers in executing their duties.
Conduct special investigations, as directed, on accident, death and fire damages.
Daily distribute work to inspectors as directed by Senior Assistant Electrical Engineers.
Assist at examinations in absence of Senior Assistant Electrical Engineers.
Assist on examination of plans and specifications in absence of Senior Assistant Electrical Engineers.

COURT OFFICER
(Special)
Represent Bureau on Court Cases involving ordinance violations.
Serve as Secretary of Electrical Examining Board.
Assist Senior Assistant Electrical Engineers in performance of their duties in case either party is absent.

SENIOR CLERK
General supervision of office and office personnel.
Establish office procedure.
Assist in distribution of inspectors work.
Keep all records.
Prepare special reports.
Prepare monthly and yearly report for chief inspector.
Designate routine and special duties of clerical staff.

Planned Lighting Methods

Illumination techniques in modern lighting application show trends toward lower brightness ratios, better lighting control and consideration for surrounding factors.

THE pace of lighting progress is quick. Technical achievement forges ahead. Sources, components and fixtures evolve in ever-increasing variety. In today's market, planned lighting methods are of first rank importance.

Modern lighting fixtures give us an abundance of attractive designs to harmonize with architectural features or decorations and at the same time provide efficient illumination. Lamps, components and assemblies are available for inbuilt lighting treatments and special effects. The engineered application of fixtures, components and sources to the particular job is the heart of planned lighting methods.

An examination of the best features of new installations indicates trends which we may expect to see developed further in the near future. Large area luminous ceilings will be used extensively. The eggcrate louver ceiling is but one of several practical techniques. The use of low brightness sources, like the new 40 watt T 17 five foot lamp, above louvered ceilings in offices and classrooms will reduce reflected brightness from specular surfaces.

Improvement in spectacular lighting effects, floodlighting and similar outdoor uses may be expected with mercury vapor and fluorescent sources adapted to new application techniques. Ultra-violet sources will activate fluorescent surfaces and materials for decorative treatment and low intensity applications. Better fixture designs are bringing better control of quality and direction from fluorescent lamp sources. The incandescent lamp still provides the most flexible source where accurate control of direction, color and quality of light is essential as in window lighting or stage and theater application.

The following pages describe and illustrate selected but typical examples of the planned lighting trend in six major areas of lighting application. It is notable that, though each installation has been designed for a particular application, most use conventional types of manufactured lighting fixtures. Here is clear, emphatic testimony that the careful selection of well engineered and well designed fixtures is basic but the methods and techniques used in their installation and adaptation to the particular lighting task are of equal or greater importance in achieving the lighting effect.

LIGHT...for Selling

ANALYSIS of *planned lighting* methods used in recently completed store installations reveals a sound trend. Lighting techniques which produce light for "selling" are being used.

The *lighting result* is the paramount objective in planned lighting today, in any type of installation. In the store, the lighting result must be pleasing and colorful. It must set the stage for effective display, create a restful atmosphere, accent and highlight the merchandise. Lighting equipment must be subordinated to the lighting result. Fixtures, components, light sources—these are merely tools which the lighting designer uses to work out the desired lighting effect. With these tools, he creates a specific lighting result for each job. They should be as inconspicuous as is canvas, oils and brushes which an artist uses in creating highlights, shadows, and color to form a painting.

The store lighting designer must visualize the final lighting result before he begins his layout work. He must interpret the architect's or decorator's conception of the interior, and combine light with architecture and decoration to achieve the desired effect. He must know what intensity of illumination is necessary, and what degree of light diffusion is required. He must know the direction from which the light should come, and what the color quality of the light should be. With these and similar factors established, selection of the lighting method becomes a routine job. Type and size of fixtures or components, location of units, and type and size of light sources can then be determined quickly and easily. Thus variety in layout and in techniques must be used to make each job distinctive. This requires full knowledge of the lighting tools available, as well as of lighting methods, and the ability to plan new and unusual combinations of light and decorations.

Light for selling is logically divided into three classifications; show window, general interior, and interior display lighting. Each has its own specific objectives and methods of solution.

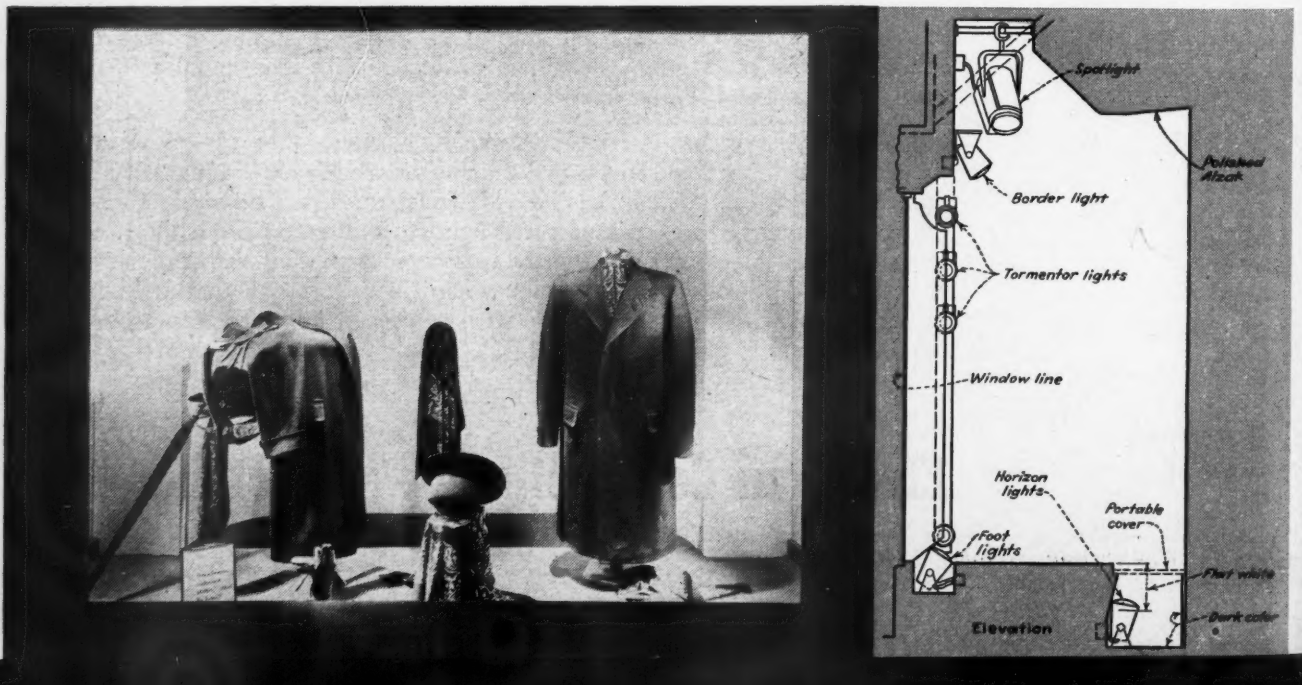
The objective of show window lighting is to attract customers to a store, and to light the displays so the merchandise may be visually inspected easily by prospective buyers. Show windows vary greatly in size and shape. Merchandise displays also vary in type and style. These variations require flexibility in lighting effects, and the use of many window lighting techniques for best display results.

High intensity white lighting has been used for many years for show window lighting. It is still good practice. Super lighted windows attract more passersby than show windows having lower intensities. Reflectors having asymmetric light distribution offer the greatest efficiency at minimum operating cost. Spot and flood type reflector lamps installed on adjustable swivels are also finding favor in recent installations, due in part to lower first cost, and flexibility of beam adjustments, plus color accessories.

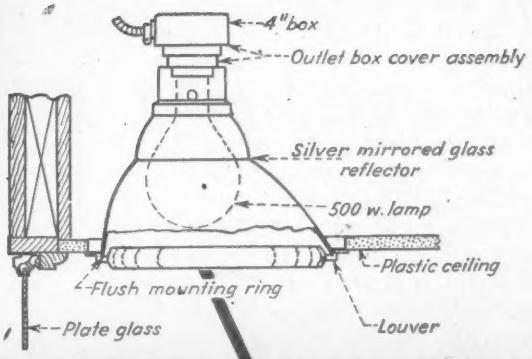
Stage lighting techniques are gaining favor in show windows. Borders, floodlights, drama, horizon and footlights equipped with color are being used to paint colorful background effects. Lens and louvered spots are used to accent displays with dramatic beams of while light against these backgrounds of color. Colored fluorescent lamps are

(*Continued on page 76*)

Typical show window in new store of John David, Inc., 608 Fifth Avenue, New York City. Plain background is transformed into appropriate color for merchandise displayed by use of theatre lighting techniques—three colors and dimmer-controlled circuits. Beams of white light from lens spotlights and louvered tormentor lights accent the displays against backgrounds of selected varying colors. *Lighting Equipment—Century Lighting, Inc., New York City. Electrical Contractor—Lowy and Donnath, New York City.*



Uniform intensity of illumination lights the furniture display in the Artek-Pascoe modern furniture store on 49th Street, New York City. Standard 60-watt incandescent lamps are used in the 48 modern design aluminum reflectors, stem suspended from ceiling and uniformly spaced over the entire window area. *Lighting Equipment—General Lighting Company, New York, N. Y.*



The entire store of Adrian Dress Shop, Pittsburgh, Pa., is a show window. Models at front of store are highlighted by 500 watt lamps in recessed silver mirrored glass reflectors, 18 inches on centers, equipped with eccentric louvers. Other silver mirrored glass reflectors are installed flush in suspended architectural elements within store. Fluorescent lamps behind wood valance light interior display cases and upper walls, also miniature show windows at entrance. Maintained illumination intensity within store is 38 footcandles average. *Lighting Equipment — Pittsburgh Reflector Company, Electrical Contractor—K. K. Wood, Pittsburgh, Pa.*

LIGHT... for Selling

being used to some extent to provide the background color effects.

Some types of show windows, such as those displaying furniture, require a uniform intensity of illumination over an entire large display area. Recent techniques include use of fluorescent lamps above a ceiling of diffusing glass, incandescent lamps in recessed louvered reflectors symmetrically spaced over the area, and reflector lamps installed high over a gauze ceiling. One lighting designer used a straightforward solution by suspending rows of modern design reflectors from the ceiling, which conform in appearance with the modern, all-glass front store design.

General interior illumination is required in stores to permit ease of seeing, to create or form a part of the decorative treatment and to set the mood or atmosphere for the store. Harmony between architectural design, decorative treatment and lighting is important. Lighting effects should predominate over lighting equipment. Lighting components should be concealed, light sources should be shielded, and it is desirable that exposed lighting units be functional in layout, as well as producers of light. Ceiling and wall coves may be used to emphasize architectural and decorative details. Continuous row units may be used to accent size and length of interiors. Recessed units may form decorative pattern effects in ceiling, and tie in with traffic aisles, feature displays, or store fixture layouts below. Location and arrangement of lighting equipment can subtly guide traffic flow within a store. Customers' eyes follow the light paths created for them.

Recent installations in large area store interiors are based on a system of general uniform illumination throughout, supplemented with cove, or other decorative lighting effects. The general lighting is usually provided for by means of shielded direct lighting type incandescent units recessed in the ceiling, or by fluorescent units, usually of the continuous row type. Supplementary lighting is provided by indirect coves, wall urns, or fluorescent lamps shielded by valances so that light is directed downward onto wall cases as well as upwards on the wall and ceiling.

A refreshing new approach to lighting with luminous ceilings has been used in some recently completed stores. It consists of the use of egg-crate design metal louvers to form the ceiling, with light sources concealed above. The louvers shield the lamps from view, permit the light to flow through the ceiling to the area below, and pick up just enough light on the visible sides of the louvers to light them softly. Color quality of the resultant illumination with this lighting method may be accurately controlled through proper combination of fluorescent and incandescent lamps above the louver ceiling.

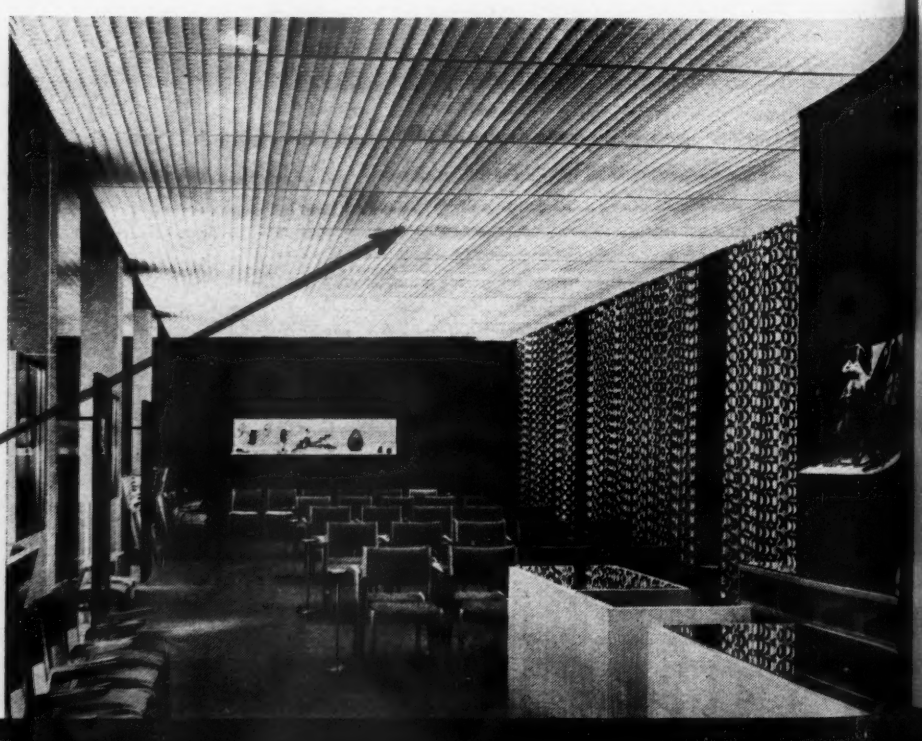
Large area low surface brightness diffusing glass panel units which cover approximately half the ceiling are also being used in recent jobs. This method permits lighting intensities of 50 footcandles and higher without excessive brightness, and is particularly well suited to smaller stores.

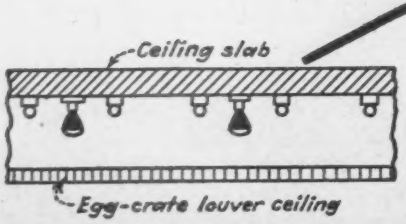
Small stores and specialty shops lend themselves to many lighting techniques. Many designers are using floor-to-ceiling mirrors on the rear wall, with continuous row fluorescent units, either suspended or ceiling mounted, extending from front to back. This gives the effect of a larger store. Lighted wall display niches, ceiling soffits, etc. often provide much useful general lighting in small stores, and adds an important decorative touch at the same time.

Long slim fluorescent lamps are ideal for showcase and wall case lighting, eliminate the hot spots on cases which resulted from incandescent lamps, and provide uniform illumination throughout the cases. Feature displays are highlighted by reflector spot lamps, concealed in continuous row fluorescent units, or recessed flush in the ceiling.

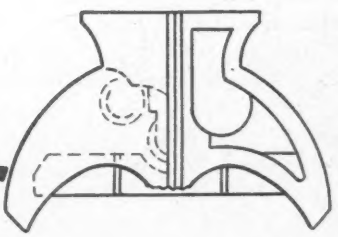
The lighting designer must work closely with the store designer if maximum lighting effectiveness is to be realized. Each new store design presents a new opportunity for the lighting specialist; an opportunity to adapt new and old light sources and lighting components in new and appropriate lighting methods. Many good methods are available. The success of each job depends on the ability of the lighting engineer to intelligently plan both the lighting and decorative effect wanted by the store designer.

Luminous ceiling in the new Fifth Avenue Florsheim Shoe Store, New York City, is an all-metal egg-crate louver design. Continuous rows of fluorescent lamps and individual R-40 types incandescent lamps are concealed above the ceiling, projecting high intensity illumination of good color quality to the sales area below. Front and side of store are of all-glass construction. Lighting was planned by Ketchum, Gina & Sharp, architects, New York. *Electrical Contractor—Irving Finkelstein, New York, N. Y.*



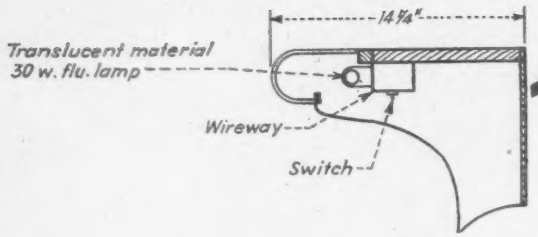


Main floor of Penn Furniture Company, Altoona, Pa., is lighted with fluorescent cove lighting, recessed fluorescent troffers with glass panels, and recessed louvered incandescent reflectors of silver mirrored glass. Cove lighting accents the suspended curved ceiling. Recessed units form neat pattern arrangement in suspended architectural element. *Lighting Equipment—Pittsburgh Reflector Co, Pittsburgh, Pa. Electrical Contractor—G. A. Reger Electric Co., Altoona, Pa.*



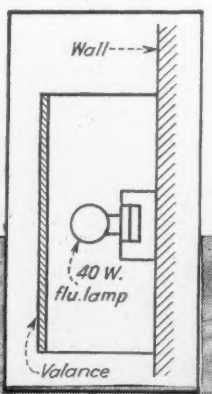
General illumination in the Star Market, Philadelphia, Pa., averages over 50 footcandles throughout, with high level vertical lighting on display shelves. Forty-four 3-lamp 40-watt semi-direct lighting units are arranged in four continuous rows, suspended 9 feet from the floor on a 12-foot ceiling, with rows spaced 8 feet apart. Initial footcandles ranged from 64 to 75 after three months use. *Lighting Equipment—Edwin F. Guth Co., St. Louis, Mo. Electrical Contractor — Allied Air Conditioning and Engineering Co., Philadelphia, Pa.*

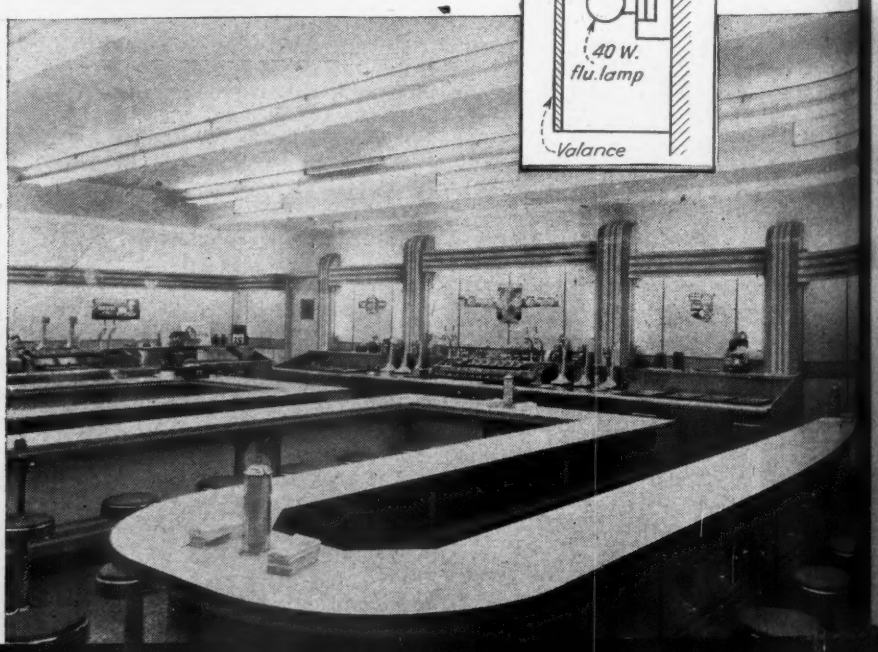
LIGHT... for Selling



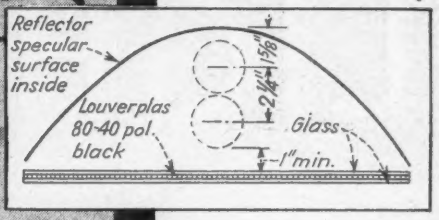
Fluorescent lighting built into counter display lights card counter in the Lansing Camera Shop, Inc., Lansing, Michigan. Sixty footcandles of general lighting is provided by URC type suspended units. *Lighting Equipment—Solar Light Manufacturing Company, Chicago, Ill. Electrical Contractor—Barker-Fowler Electric Co., Lansing, Mich.*

Two continuous rows of surface mounted fluorescent direct lighting equipment provide general illumination in Berland Shoe Stores, Inc., Chicago, Ill. Note uniform intensity over entire area, including good vertical lighting of stock shelves on side walls. *Lighting Equipment—DayBrite Lighting, Inc., St. Louis, Mo. Electrical Contractor—Hoffman Electric Co., Chicago, Ill.*



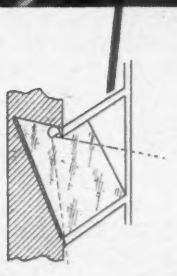


Surface troffers installed on ceiling in the retail sales area of Warren Sanitary Milk Company, Warren, Ohio, produce over 75 footcandles of general illumination. Metal egg-crate louvers shield the 3500° white fluorescent lamps. Fluorescent strip lights concealed by a wood valance add a decorative touch and light side walls. *Lighting Equipment—Edwin F. Guth, Company, St. Louis, Mo. Electrical Contractor — Hutton-Jones Electric Company, Warren, Ohio.*

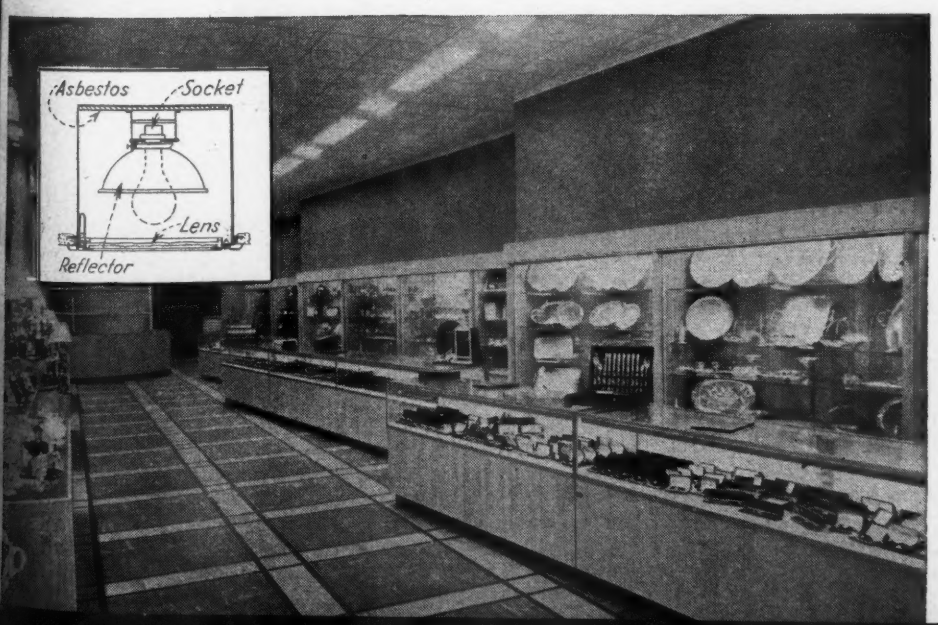


Display boards in E. I. DuPont's exhibit at the Plastics Exhibition, Grand Central Palace, New York City, were lighted by tandem-lamp units. Two 100 watt lamps in tandem were used on each of four sides of the exhibit; top, bottom and two sides. Note uniformity of illumination and absence of shadows. *Lighting Equipment—Doane Products Corporation, Meriden, Conn. Display Boards—Gardner Displays, Pittsburgh, Pa.*

Two clever supplementary lighting ideas are used in this corner of a model shoe store, part of General Electric Company's Lighting Institute, Nela Park, Cleveland, Ohio. Feature items are displayed in the well-lighted wall display niche, where they may be seen easily by the shopper when examining the fit and appearance of try-on shoes in the illuminated foot mirror.



Lindel's Jewelry Store, Toledo, Ohio, uses flush installed troffers with diffusing glass panels for general lighting, and recessed incandescent units with prismatic glass lenses for highlighting floor cases. Supplementary lighting of floor and wall cases accents the merchandise displays. *Lighting Equipment—R. and W. Wiley, Inc., Buffalo, N. Y., The Holophane Co., Inc., New York City.*



LIGHT... for Commerce

GENERAL and private offices, banks, public buildings, restaurants—these and similar spaces comprise the locale for today's commerce. With the stepped-up tempo of commerce in the postwar era, good illumination is a necessity. Planned lighting, designed for maximum ease and comfort in seeing, will increase efficiency, decrease absenteeism, and aid in soothing the frayed nerves of overworked executives and employees.

During the past decade eye specialists, illuminating engineers, and research laboratories have learned much about the relation of the eye, light, and vision. Exhaustive studies have embraced not only footcandle intensities of illumination on the work area, but also brightness relations of the work to the surrounding field of vision. Such studies have included finishes of interiors, of desks and office furniture, and of floors. They have also included the glare effect of the sky through open windows, color, direct and reflected glare, and many other factors.

In planning light for commerce, illuminating engineers must take full advantage of the results of these many studies. Lighting methods must be selected and adapted to each job which will meet the many rigid requirements of comfortable vision. Thus, the lighting specialist's obligation in planning light for seeing extends beyond the selection of light sources, fixtures, watts per square foot, mounting heights and spacings, and similar normal functions of the lighting engineer. Based on his knowledge of the eye and factors influencing comfortable vision, he must also concern himself with the selection of color and finish of ceilings, walls, floors, even furniture, in order to provide a lighting result which will fulfill the requirements of a good lighting installation. Through his contact with the architect, builder, and owner, he is in an excellent position to render this worthwhile service.

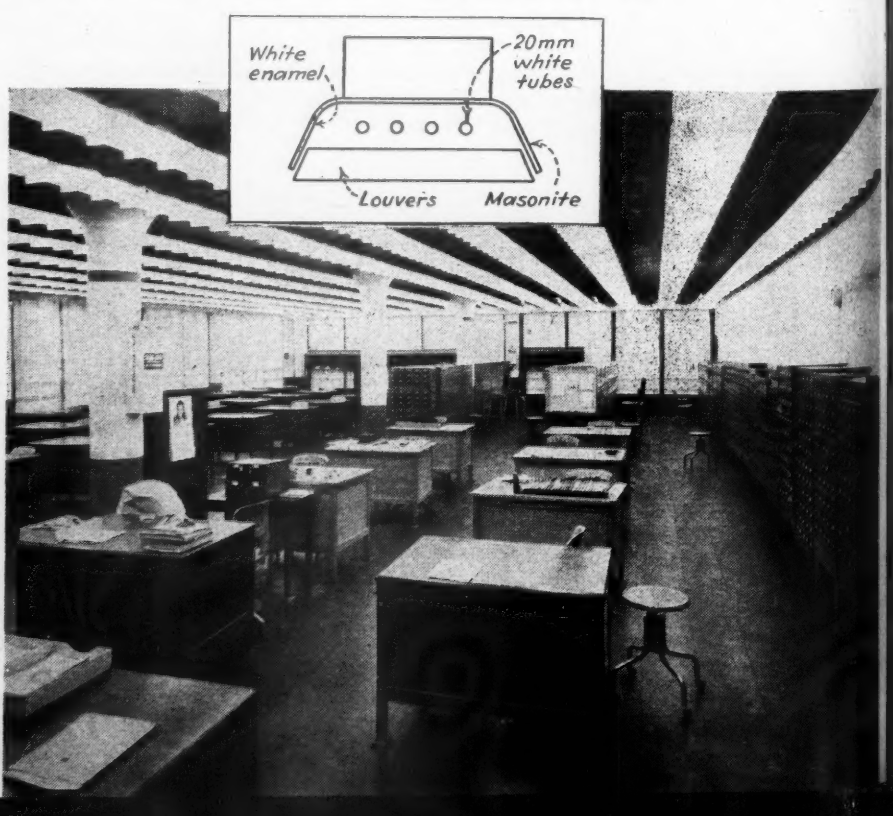
The fluorescent lamp, with its higher efficiency in light output and lower surface brightness, has aided the illuminating engineer in providing improved lighting results. It has also introduced many new application techniques. Much progress was made during the war years in adapting this lamp to lighting progress in the essential industries. The color qualities of light from this lamp have been improved during this period, and further improvements are expected. Its advantages over incandescent lamps in producing better light for better sight have made it the standard light source for lighting problems involving comfortable vision over long periods of time.

Considerable research has been made with a new 40 watt fluorescent lamp, using the five foot long, T-17 tube. Surface brightness is reduced very materially over the standard 40 watt fluorescent lamp. More research with new type reflectors and fixtures, using this new light source, is needed. Due to the low brightness of the tube, it is believed that it offers an opportunity for new methods incorporating improved economies in equipment and maintenance.

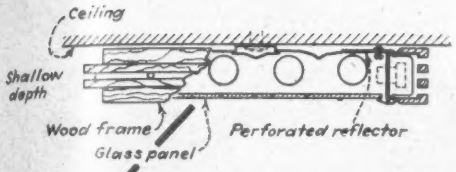
As construction controls are relaxed, one of the major tasks of the lighting industry is to provide the methods and equipment for relighting the thousands of existing spaces for commerce, and for the many new buildings which will be constructed. A review of current trends indicates that the industry is geared to do this job on a sound basis.

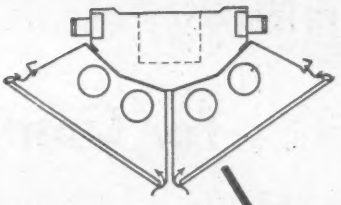
Recently completed installations follow the same general approach to solution of the lighting problem. Methods vary only to an extent that is to be expected due to physical

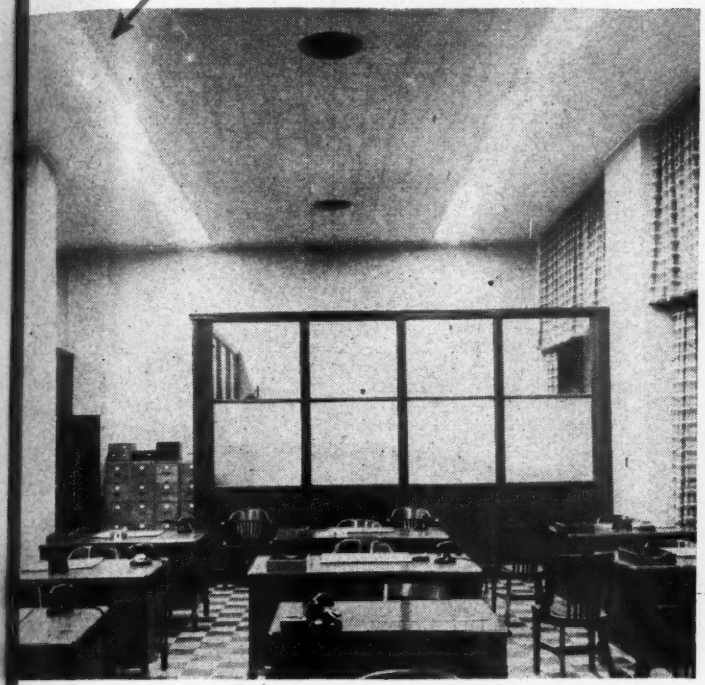
(*Continued on page 82*)

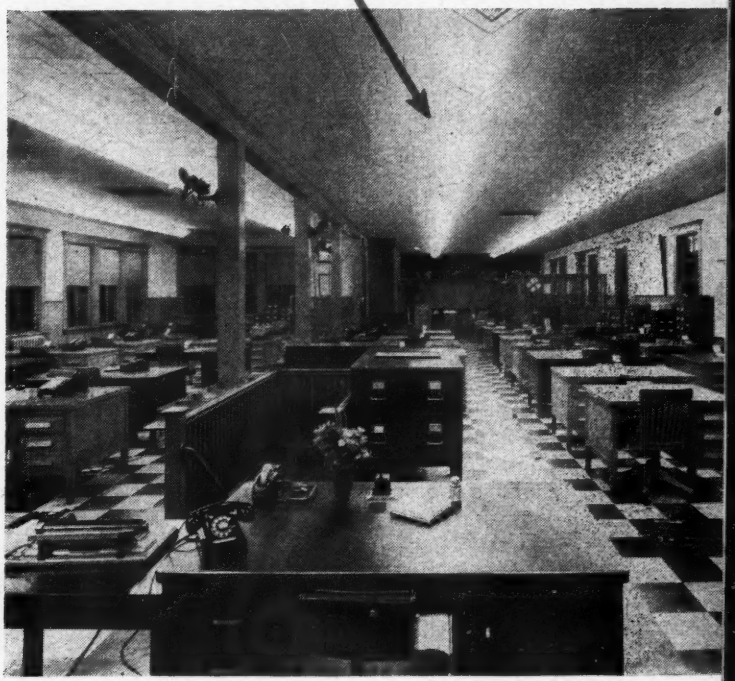


Light for seeing is more than a matter of lamps and lighting fixtures. The finish of ceiling, side walls, floors—even of furniture—is also pertinent. Over 100 maintained footcandles has proved comfortable and increased office efficiency in the Fingerprint Identification Department, U. S. Marine Corps, Philadelphia, Pa. Ceiling is white, side walls are daylight green, and dado finish is gray-green. Light finish on desks and filing cabinets lowers brightness contrasts. Reflectors are 20 inches wide, installed on 3 ft.-2 in. centers, 9 ft.-6 in. from floor, equipped with vertical louvers on 9 in. centers. Light source is cold cathode lamps, with a total load of 7.5 watts per square foot. ***Lighting Equipment—Colonial Lighting, Inc., North Bergen, N. J.***



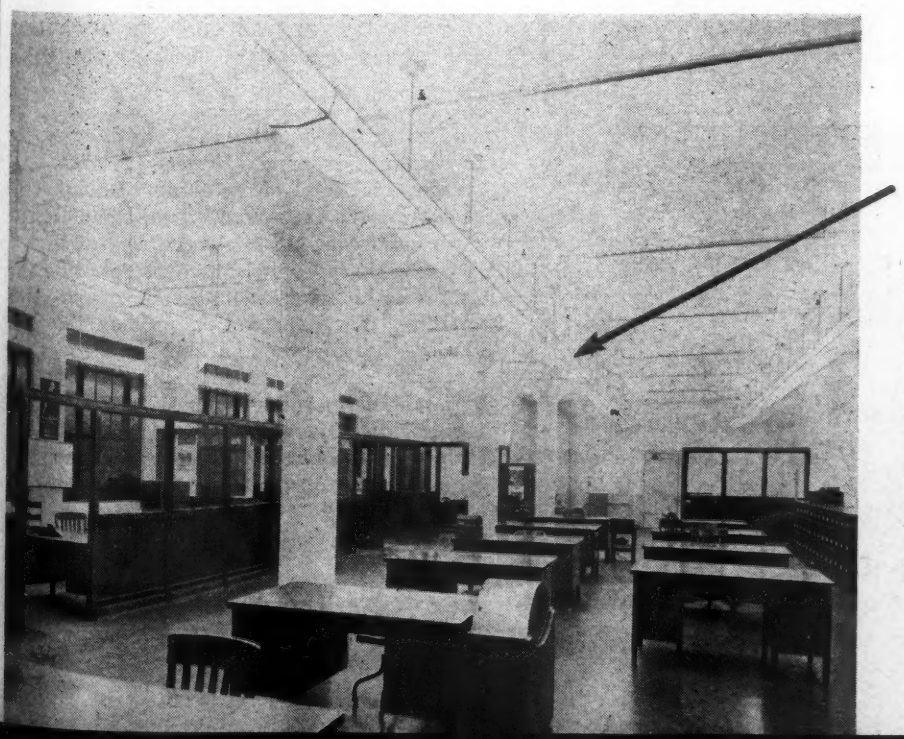


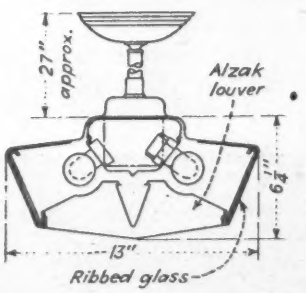




General offices of American Sugar Refining Company, New York City, are lighted with surface mounted continuous row fluorescent units. Flush troffer effect results through use of shallow type units, which contain four continuous rows of 40 watt lamps. Note wide spread of light on rear wall, which produces uniform intensity of 35 footcandles on work plane. *Lighting Equipment—A. L. Smith Iron Co., Smithcraft Division, Chelsea, Mass. Electrical Contractor—Oneida Electric & Motor Co., New York, N. Y.*

An "in service" intensity of 50 footcandles is maintained in the general offices of Suburban Gas & Electric Company, Revere, Mass., with V-shaped four-lamp continuous lines of semi-direct lighting fluorescent troughs. Unit provides soft light on ceiling, with wide spread of light normal to length of fixture. Diffusing glass shields reduce surface brightness to a comfortable range. Glass shields are hinged for easy maintenance. *Lighting Equipment—Litecontrol Corp., Watertown, Mass. Electrical Contractor—Deroo Electric Co., Winthrop, Mass.*

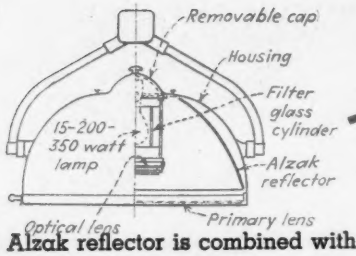




Continuous rows of suspended direct-indirect fluorescent units, incorporating two 40 watt lamps per four-foot length provide ideal illumination for office tasks in the offices of the Liquid Carbonic Company, St. Louis, Missouri. Note minimum contrast between the lighted fixture and luminous ceiling, and uniform intensity throughout. *Lighting Equipment—Day-Brite Lighting, Inc., St. Louis, Mo. Electrical Contractor—Gamp Electric Company, St. Louis, Mo.*

LIGHT...

for Commerce



Large 36-inch Alzak reflector is combined with filter glass and lens assembly in this suspension type adjustable operating room fixture, installed in the Baptist Memorial Hospital, Memphis, Tenn. A two filament lamp of the 150-200-350 watt type permits a range of light intensities to meet the demands of the surgeon. An Aklo blue-green heat filter glass surrounds the lamp to absorb heat from the light rays and to aid in producing a cooler beam of light. The canopy light uses four standard 60 watt lamps. ***Lighting Equipment—American Sterilizer Co., Erie, Pa.***

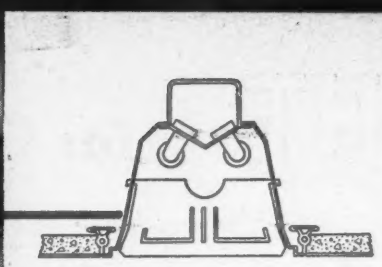
characteristics of the lighting components and equipment used. Ceilings are being finished in white, with reflection factors of 75 to 85 percent. Sidewalls are being finished in pale green, light tan, or other pastel colors depending upon the decorative treatment to be used, with reflection factors of 55 to 70 percent. Floors are being finished in lighter colors than has been the practice in past years, with reflection factors of 25 to 45 percent. In many instances desks and furniture are being refinished in lighter colors. Mat finishes are used throughout, to prevent specular reflection, or reflected glare. This trend toward lighter finishes increases the efficiency of the lighting system, aids in establishing better brightness ratios, and creates a more cheerful atmosphere which is conducive to better employee morale.

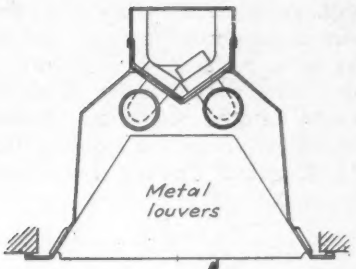
Types of lighting equipment vary from ceiling recessed direct units to suspended opaque indirect units. A large majority of the installations use the fluorescent light source. The trend is more and more toward continuous row equipment. Lighting intensities range from 30 to 100 footcandles, with a great majority averaging 50 to 60 footcandles. A few installations which have installed higher intensities are practical due to the larger areas of equipment which permit lower surface brightnesses.

In providing light for commerce, eye comfort is of paramount importance. Lighting equipment should be inconspicuous, with brightness of equipment held to a minimum. Lamps should be shielded to prevent direct glare in the line of vision. For intensities lower than 50 footcandles, lamps should also be shielded from the work areas, to prevent reflected glare of lamps exposed to work areas. Direct lighting type troffers and louvered type suspended fixtures should be used only where the designed maintained intensity is above 50 footcandles. This is particularly true where desk tops and other furniture are not light in color.

Private offices may be lighted effectively through asymmetrical equipment layouts, if the method is wisely selected with respect to furniture layout. Cove lighting, or the use of large area luminous ceilings, are effective in producing adequate illumination of proper color quality in public areas, such as banks, reception rooms, and hotel lobbies, etc.

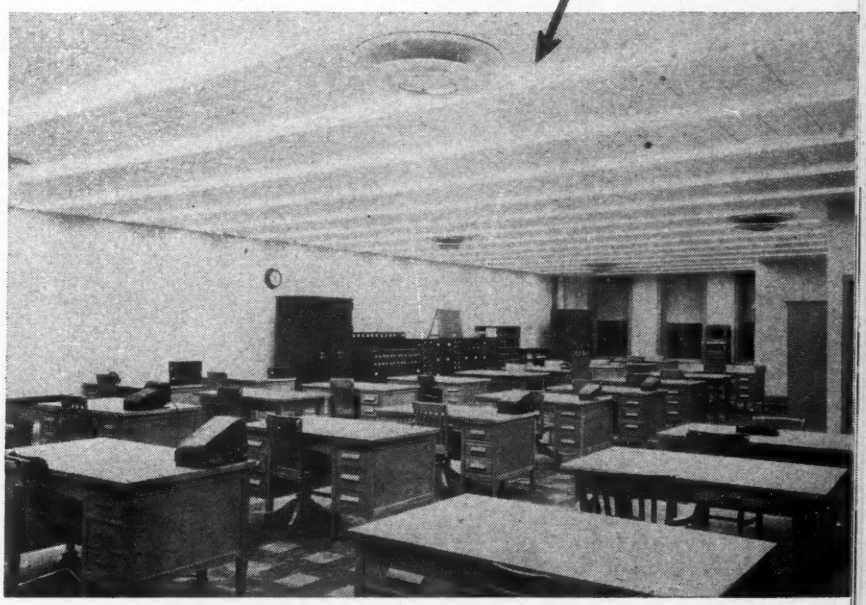
Cold cathode tubing lights the newly redecorated East India Room cocktail lounge of Hotel Hawthorne, Salem, Massachusetts. A reverse cove, containing a continuous 15 mm. tube, operated at 30 ma. is the only source of light. It directs its illumination to the murals surrounding the room, which creates the illusion that the painted sky is the actual light source. Average intensity is approximately two footcandles. ***Lighting Design—Sylvania Electric Products, Inc., Salem, Mass. Installation and Equipment — Leslie Sign Co., Salem, Mass.***



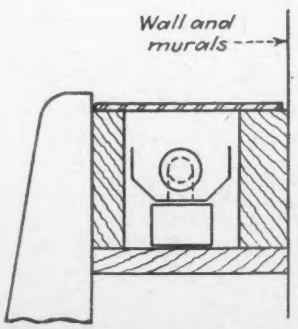


Recessed troffers with baffles are arranged in geometric pattern to provide uniform lighting intensities and decorative treatment in the Children's Room, Decatur Public Library, Decatur, Illinois. A total of 3 watts per square foot produce 51 to 59 footcandles, readings being taken after 1000 hours use. *Lighting Equipment—Edwin S. Guth Co., St. Louis, Mo. Electrical Contractor—Ralph Makon, Decatur, Ill.*

Two-lamp 40 watt continuous troffers recessed flush on four foot centers provide ideal efficient lighting in the Wisconsin Gas & Electric Company offices, Racine, Wisconsin. Desks are light finish, with light colored tops, to prevent contrast between work and surrounding field of vision. *Lighting Equipment — Day-Brite Lighting, Inc., St. Louis, Mo. Electrical Contractor—Robert J. Bohm, Racine, Wis.*

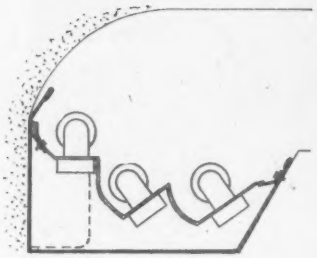


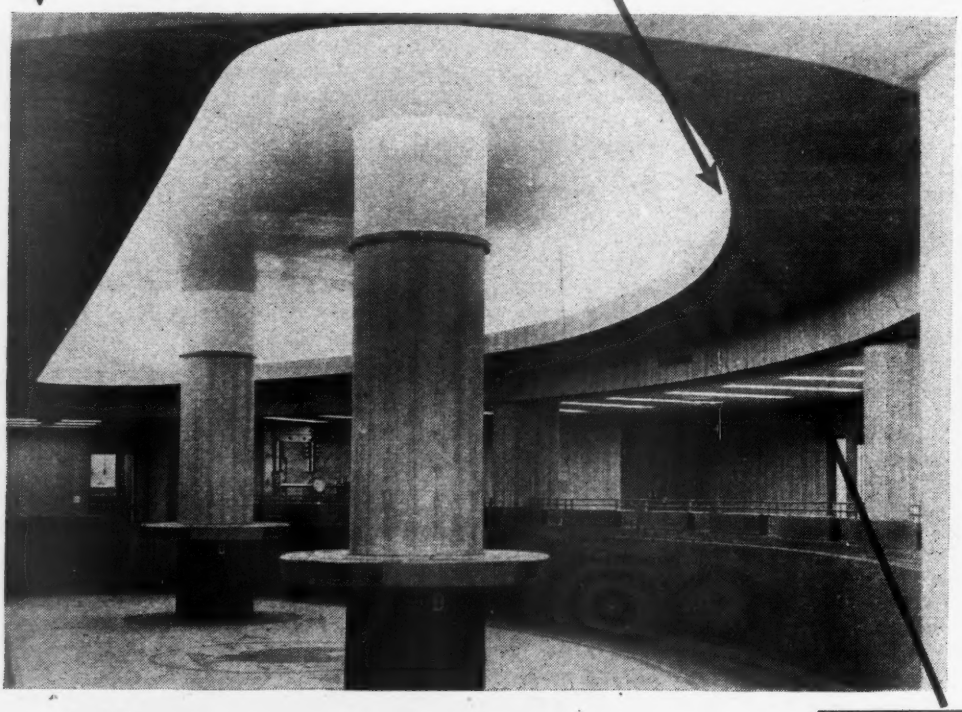
Standard fluorescent troffers were used to light the Brass Rail Restaurant, Pittsburgh, Pa. Units were recessed behind seats along the wall, and behind counters to direct the light up along the wall area, and to the ceiling. Troffers are glass enclosed. Ceiling is painted flat ivory, and gives good illusion of being luminous. Lighting was planned by Smart & Braziell, Architects, Pittsburgh, Pa. *Lighting Equipment—Pittsburgh Reflector Co., Pittsburgh, Pa. Electrical Contractor—Burke Electric Construction Co., Pittsburgh, Pa.*

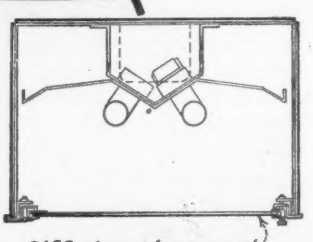


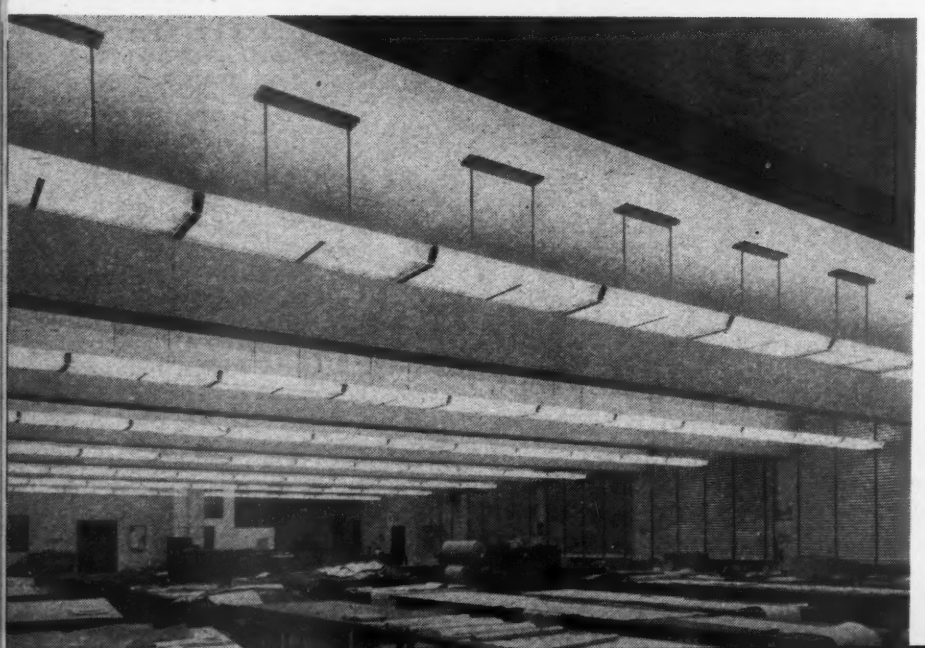
LIGHT... for Commerce

Indirect cove lighting for general illumination in the public area, and flush panel direct lighting for cashiers and tellers, comprise the planned lighting methods in the Jefferson Trust and Savings Bank, Peoria, Ill. Average intensity of 30 to 35 footcandles in the main lobby area results from three parallel rows of fluorescent lamps in the cove. Intensities of 40 to 50 footcandles are produced in the cashier's section by 18 six-foot long recessed fixtures positioned fan-wise. *Lighting Equipment—Day-Brite Lighting, Inc., St. Louis, Mo. Electrical Contractor—George Schaeffer, Peoria, Ill.*

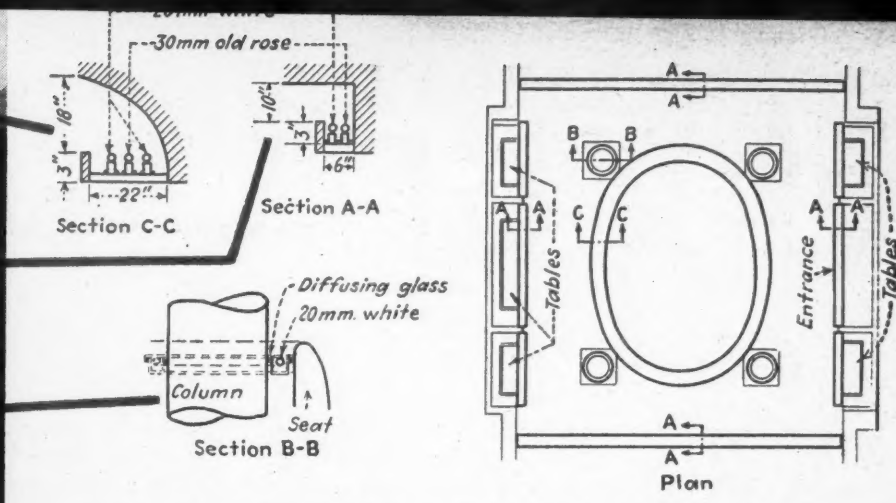






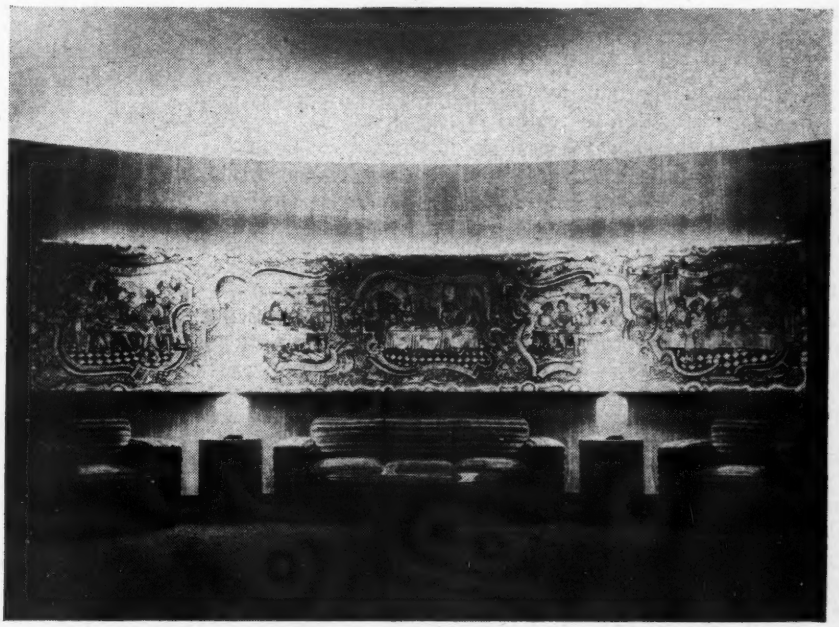


Drafting room in the Taylor-Wharton Iron and Steel Company plant, Easton, Pennsylvania, is illuminated to 63 footcandles by continuous rows of suspended semi-indirect type units. Fixtures contain four 40 watt lamps per four foot length. Troughs are installed in center of coffer effect. *Lighting Equipment—Westinghouse Electric Corp., Cleveland, Ohio. Electrical Contractor—H. N. Crowder, Jr. Company, Easton, Pa.*



Lobby of the new Pierre Grille is illuminated by two table lamps, and by two rows of white cold cathode tubing concealed behind the mural, which extends out from the wall. The Pierre Grille was designed by Samuel A. Marx, nationally-known architect and designer, and Edward H. Klein, resident architect.

Concealed cold cathode tubing in coves and around base of columns creates soft comfortable lighting result, and adds to the decorative effect in the Pierre Grille, Hotel Pierre, New York City. Main center oval cove contains three rows of tubing: two 20 mm. white, and one 30 mm. old rose. Coves at side walls use one white and one old rose tube in each cove. Murals on columns are lighted with a single line of 20 mm. tubing under glass at base of column. Color quality of resultant illumination flatters skin tones of diners, accents red upholstery and decorative finishes, and does not distort appearance of food. *Lighting Equipment—Colonial Lighting Co., Inc., North Bergen, N. J. Electrical Contractor—C. D. West, Inc., Washington, D. C.*



Continuous row luminous indirect troughs provide high level uniform intensity lighting in the offices of Public Service Company of Northern Illinois, Chicago, Illinois. Luminous sides of trough are plastic, with brightness designed to approximate the brightness of the ceiling above, so that the lighting equipment becomes unnoticeable to the office workers. Direct and reflected glare are practically eliminated. *Lighting Equipment—Ainsworth Lighting, Inc., New York, N. Y.*

LIGHT...for Industry

LIGHTING progress was primarily limited to the work world, or industrial field, during the war. Blacked-out and windowless plants focused new attention on artificial illumination. Round-the-clock operations, with demands for top production and minimum rejects, paved the way for modern lighting techniques and new high levels of lighting.

Restrictions on non-housing construction have temporarily delayed large scale industrial expansion, both in new plants and in modernization of old ones. A review of wartime industrial lighting techniques will serve as an excellent background for those who will plan the lighting for industry as construction restrictions are eliminated. .

Light is necessary for sight. Good vision is necessary for efficient industrial production. Higher levels of illumination, with proper attention to related factors of glare, contrast, and brightnesses, always result in improved vision. This has been well demonstrated in thousands of industrial plants. It is responsible, in part, for the unprecedented high production goals achieved in war production.

Providing proper lighting for the thousands of industrial tasks and processes is a big job. The visual tasks vary greatly, the types of work are many, and the size of the jobs extend from providing the proper illumination on a single machine to the lighting of acres of machines, production lines, assembly operations and inspections of finished products. There is a sound, scientific lighting technique which will solve the lighting for each visual task encountered. It is the lighting man's job to select that technique for each job which will provide maximum visibility for the worker most efficiently and economically.

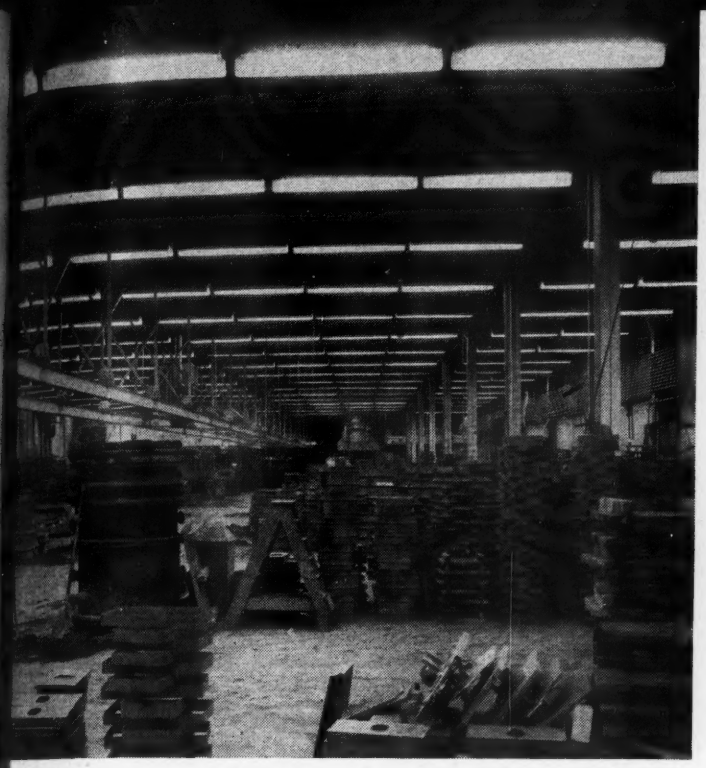
There are also many lighting tools available to solve the many lighting tasks encountered in industry. There is a wide variety of light sources, and reflectors of varying materials, shapes, sizes, and distribution patterns. There are many methods for suspension, or mounting. Paint and color also provide the proper background for better vision.

Many of the present lighting methods have been developed around the incandescent filament lamp. It is made in a variety of sizes and shapes to meet the rigid requirements encountered over the years. For many applications it will continue to be used, especially where a point source of light is required, and reflector or lens equipment has been developed to provide proper distribution patterns of light for specific industrial applications. Mercury vapor lamps have been adapted to general lighting in industrial interiors, especially in high bay areas where long life and high light output from a single unit is desirable. Fluorescent lamps with their inherent high efficiency and long life have been rapidly accepted and adapted to use in industry.

Industrial lighting problems may be divided broadly into the following classifications: general lighting for low, medium and high bay areas; specific general lighting for production lines, individual processes, and special seeing tasks; and supplementary or local lighting for individual machines, benches, or industrial operations.

(*Continued on page* 88)

The criss-cross, or grid, layout in the New York Trade School, New York City, provides 85 foot-candles on the work plane. This shows an advanced method of the proper use of fixtures and paint, as a powerful ally to lighting and seeing. ***Lighting Equipment—The Miller Co., Meriden, Conn. Electrical Contractor—Emerson Garden Electric Co., New York, N. Y.***



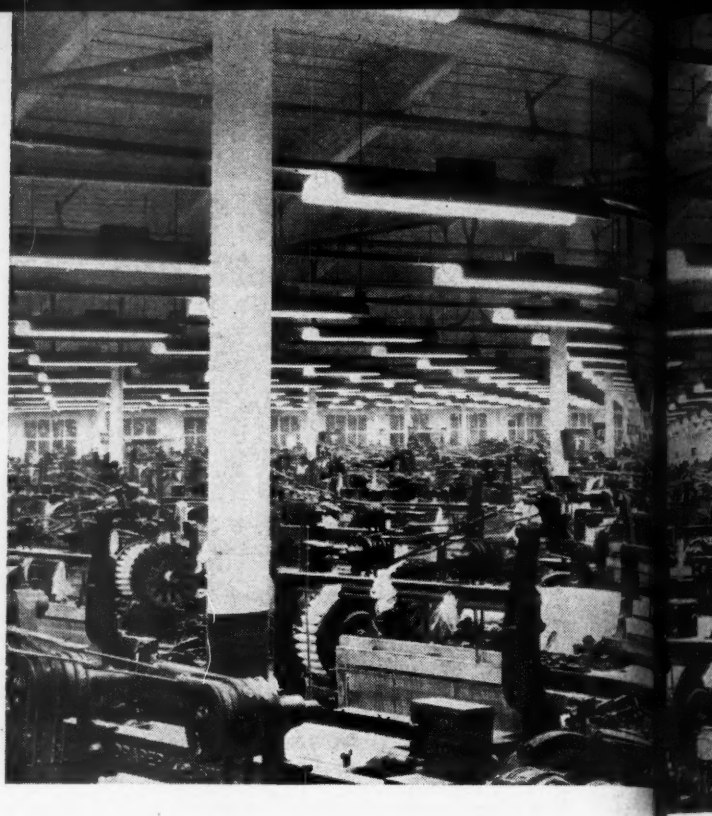
This large eastern foundry uses continuous row two-lamp 100 watt fluorescent units on continuous wireway for general lighting. Rows are on 12-foot centers, and mounting height is 16 feet. The resultant illumination is exceptionally uniform throughout. *Lighting Equipment—The Miller Company, Meriden, Conn.*

Spinning frames in Uxbridge Worsted Company's plant are lighted with continuous rows of troffers, spaced six feet on centers. In each troffer there are two rows of 40 watt fluorescent lamps. Illumination on the vertical plane of the machines is approximately 30 footcandles, with 57 footcandles on upper rolls.

The 3 kw. Type AH-9 mercury units are well suited to lighting of high bay areas to high intensities, as is well illustrated in this view of a large manufacturing plant. Here, banks of three 1000 watt filament lamps are alternated with the mercury units on 25 ft. by 30 ft. spacing, at a mounting height of 45 feet 6 inches. The resultant intensity is 50 footcandles. Staggering of mercury and incandescent units has advantage of mixing color of two light sources for better seeing conditions, and maintains lighting at a safe level in case of power interruptions, which may blank out the mercury lighting. Power for this lighting system is distributed at 575 volts.

LIGHT...

for Industry



The degree of criticalness of the seeing task involved in each area of a plant controls the footcandle intensity to be selected. For such locations as storage areas, low intensities of five footcandles and less often suffice. Where large objects are processed, such as casting forgings, etc., five to ten footcandles are adequate. As the seeing problem becomes more critical, higher intensities of general lighting are needed. Where the work involves medium, fine and extra fine detail, supplementary lighting should be used in addition to the general lighting. Intensities of general illumination up to 50, 60 and 75 footcandles have been installed in the last few years, and supplementary lighting has increased the illumination on the work and immediate surroundings from 100 to 250 footcandles. Such installations have proved to be sound economically, by increasing production, decreasing spoilage, encouraging cleanliness and neatness in plants, eliminating eye-strain among workers, providing greater safety and improved employee morale.

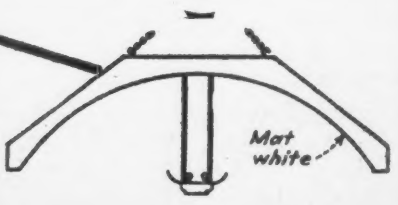
Low bay areas are generally provided with general illumination by means of medium and wide spread reflector type units installed uniformly on spacings approximately equal to the mounting height of the units above the work plane. Two-lamp fluorescent industrial type units are now being installed in continuous rows, ten feet from the floor, and ten feet between rows to provide a uniform intensity of approximately 50 footcandles. Where many machines are located in the area, the units are spaced in grid pattern, to improve the uniformity of the lighting, and to eliminate shadows.

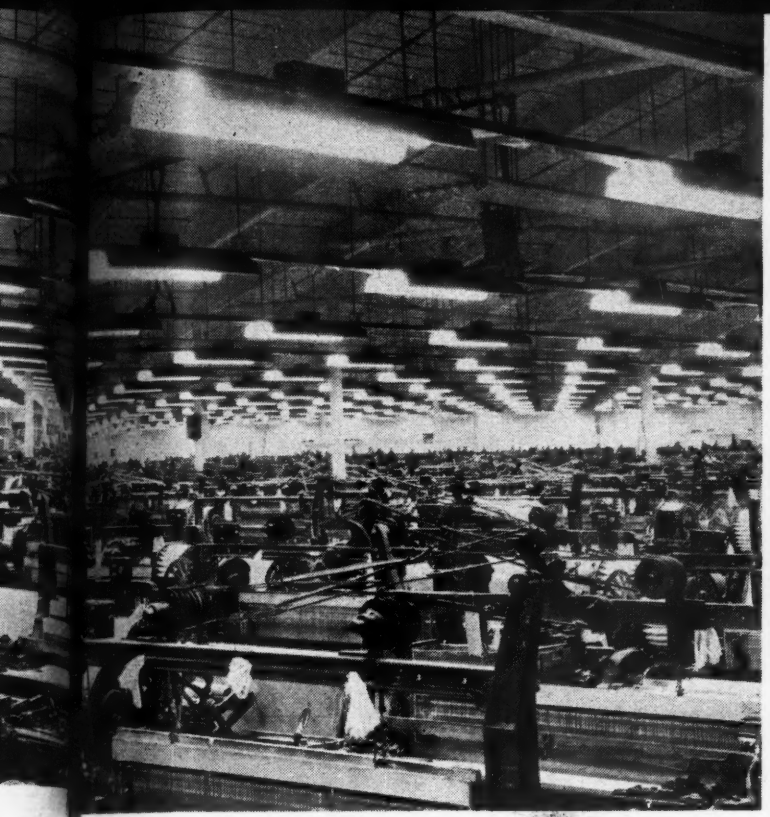
Incandescent and mercury vapor reflector units continue to be specified for medium and high bay areas. Concentrating and semi-concentrating type reflectors direct the lumens to the work areas efficiently. Where color quality of the resultant illumination is important, incandescent units are staggered with mercury vapor units, properly spaced so that fairly uniform illumination results from either the one or the other. Mercury vapor units have proved to be excellent in metal working industries, as the color of the light from these units provides high visual acuity for metal finishes, and enables workers to see imperfections and scratches readily and quickly.

Fluorescent reflectors, using two 100 watt lamps each, were adapted to the lighting of large assembly areas during the war, such as in airplane, tank and automotive plants. These wide spread type units, installed high in the ceiling, provided an apparent sky of light with good diffusion, producing high vertical illumination. Floors in many plants were painted white, so that considerable light would be reflected back to the underside of the work.

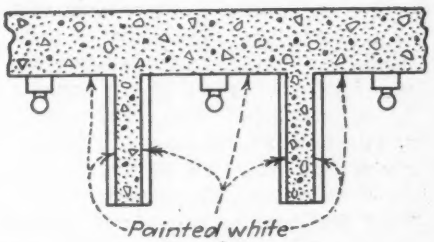
Typical assembly lines have adapted angle lighting, using either incandescent, mercury vapor or fluorescent units along each side of the line, so that light is directed efficiently to the work areas.

Indirect lighting from an inverted industrial type reflector in a large hood provides a high intensity of glare-free lighting over this inspection bench, in the Cleveland Pneumatic Aerol Company plant. The hood is cleaned periodically to maintain the lighting efficiency. *Lighting Equipment — Westinghouse Electric Corp., Cleveland. Electrical contractor — Grant Electric Co., Cleveland, Ohio*



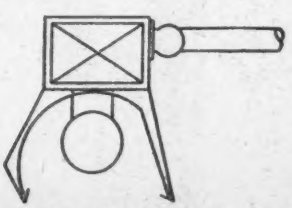


This planned lighting method takes advantage of the structural elements in the ceiling, and illustrates new design possibilities. The installation provides 85 footcandles on the work plane, and is in the plant of W. M. Welch Manufacturing Company, Chicago. One continuous row of 40 watt fluorescent lamps is installed on simple wireway channel in each coffer. Coffers are painted flat white inside. *Lighting Equipment—Curtis Lighting, Inc., Chicago, Ill.*



Individual reflector units are installed 9 feet on centers on continuous wireway in the weave room of Soule Mills, New Bedford, Mass. (Above). Additional units may be installed at later date, if more light should be needed, using present channel. Reflectors are installed 9 feet from floor and intensity is 35 footcandles average. *Lighting Equipment—The Miller Company, Meriden, Conn. Electrical Contractor—Electric Service & Sales Co., New Bedford, Mass.*

Localized lighting supplements the general illumination in the General Electric Company's East Cleveland Lamp Works to provide the best possible seeing conditions for extremely critical seeing tasks. From 100 to 500 footcandles are provided on the work, with general lighting averaging 50 footcandles. Single 30 watt fluorescent lamps are used over the benches



LIGHT...
for Industry

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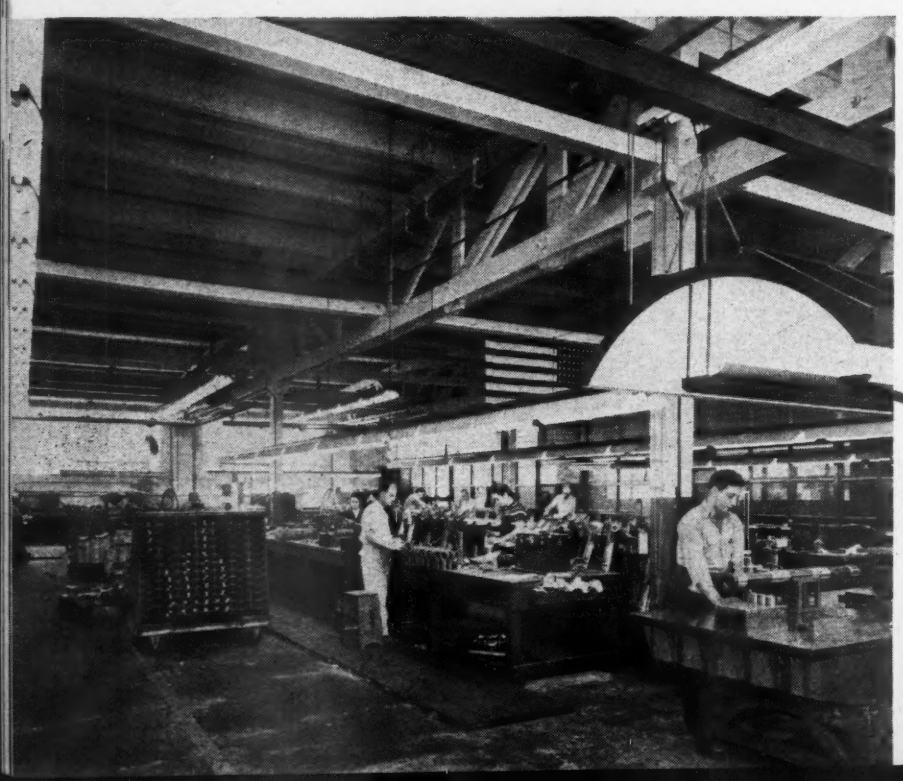

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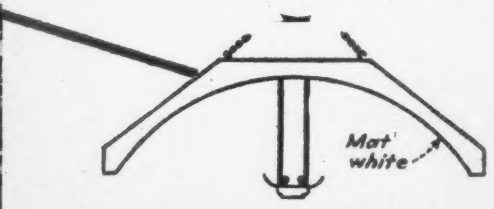

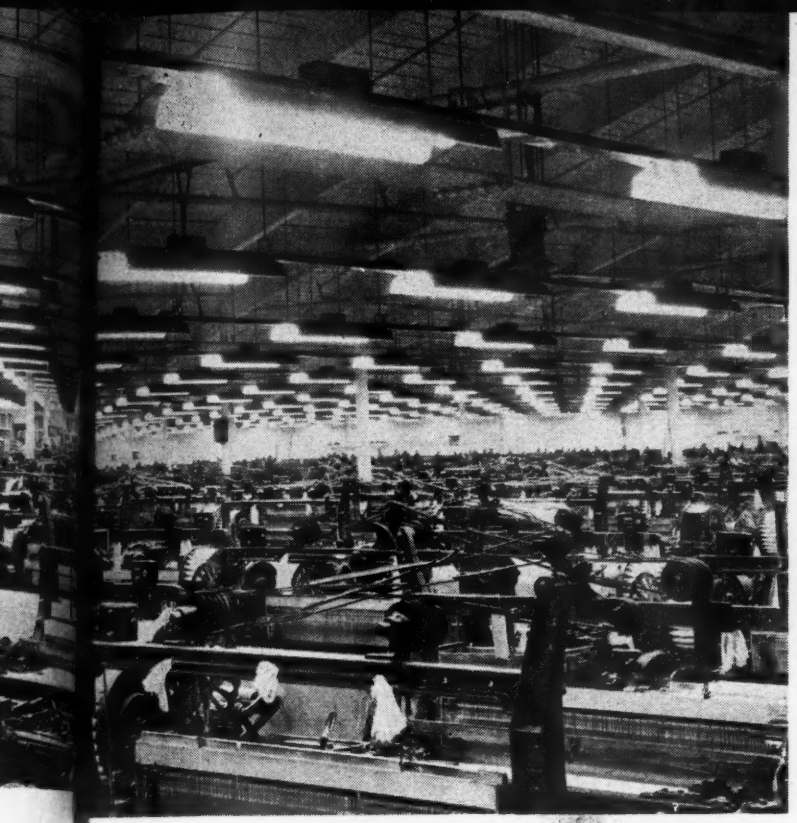

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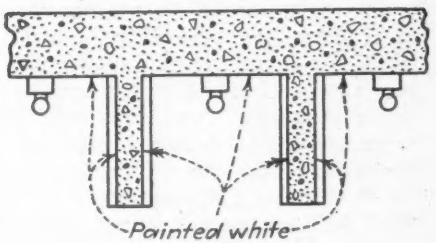

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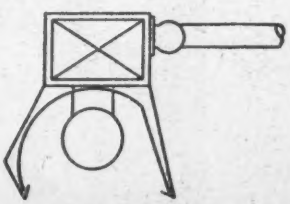


LIGHT... for Safety

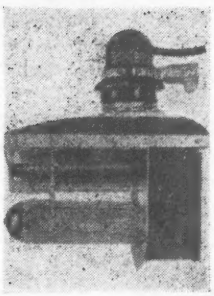
Sodium vapor lighting has proved effective in lighting danger spots and in reducing the possibility of accidents. Its characteristic yellow color suggests caution, and is practical for grade crossings. Two units, one on each side of the tracks and highway, adequately light the above crossing on the Chicago, Milwaukee and St. Paul Railroad near Fairbault, Minn. ***Lighting Equipment—General Electric Company, Schenectady, N. Y.***

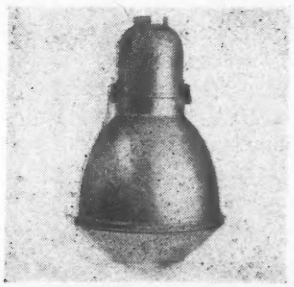
LIGHT is used in many ways to promote safety. Adequate illumination in an industrial plant prevents accidents, enables workers to see danger points and avoid them. Illuminated signs direct people to exits in case of emergency, or away from danger points, such as high voltages. Good street lighting enable motorists and pedestrians to see where they are going, and to avoid collisions. Illuminated traffic signs guide motorists, tell them when it is safe to go, when they should slow down and use added caution, and when to stop. These same signs give the pedestrian an opportunity to cross streets safely.

In this highly motorized era, street and highway lighting is more important than ever before. Most accidents on the highways are due to inadequate vision, proven by statistics of night accidents over daytime accidents. Better illumination can help to reduce these accidents and save lives. Highway lighting is a specialized field. It involves the economic distribution of power, proper location, spacing and mounting height of luminaires, and selection of the correct type of reflectors or refractors to light the roadways most efficiently and effectively. The Illuminating Engineering Society's "Recommended Practice of Street and Highway Lighting," recently completed, furnishes a sound basis for planning these lighting systems.

Public buildings and industrial plants use floodlights mounted on the buildings, or on poles nearby, also specially designed fence lighting units, to prevent sabotage. Similar units are also used around docks and piers for the same purpose, and to provide useful illumination for loading and unloading ships.

Sodium vapor luminaires illuminate an underpass on the Grand Route Highway, near St. Louis, Mo. The effectiveness of this type of highway illumination is demonstrated in the picture at left by the fact that the pedestrian stands out so clearly. *Lighting Equipment—General Electric Company, Schenectady, N. Y.*





The Davison Freeway, Highland Park, Michigan is illuminated with 15000-lumen series incandescent lamps in Form 81D General Electric luminaires, installed 26 feet high on approximately 100-foot staggered spacing. This installation has proved so successful that its quality of illumination has been incorporated in the revised Street Lighting Code of the Illuminating Engineering Society. Luminaires on the flanking service road use 10000-lumen lamps.

Narrow streets are effectively illuminated with two-way luminaires installed over center of street by means of an 18-foot bracket arm from poles. Four-way luminaires are used at intersections. Mounting height is 24½ feet over street, with units located 300 feet apart. This type installation is also suitable for narrow highways. It is important that these units be installed as high as possible, to reduce glare. *Lighting Equipment—General Electric Company, Schenectady, N. Y.*

LIGHT...for Play

SPORTS, favorite pastime of the American public, are back again stronger than ever after sharp curtailment during the war. Baseball, football, hockey, tennis, golf, basketball, racing—these and many others attract young and old alike.

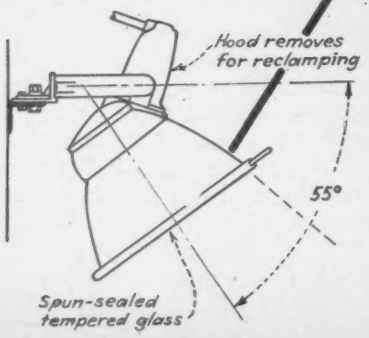
With unemployment at a new low, millions of workers demand night time sports. Night baseball has had its greatest season. Football is expected to hit the same popularity in the nights ahead. Skating and other winter sports will be more popular than ever after dark.

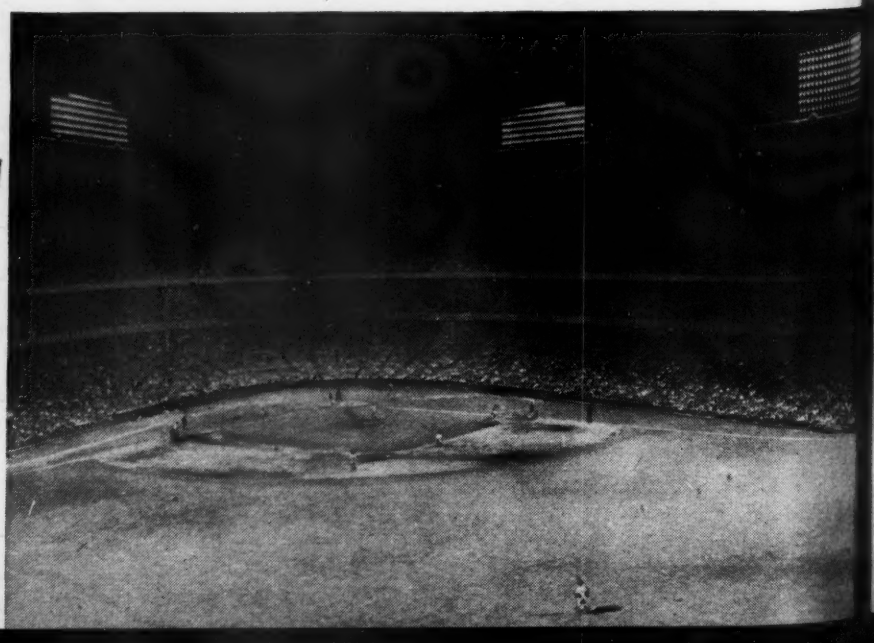
Lighting methods for most outdoor night sports involve the use of floodlights. Enclosed type units, with concentrating reflectors find favor where accurate control or long throw of light is necessary. Open type floodlights are used for wide spread illumination and short distances of projection. Enclosed projectors, with special control lenses light golf driving ranges. Both open and enclosed type floodlights are used for lighting tennis courts. Small projectors provide adequate lighting for shuffleboard, outdoor ping-pong, and similar home games. Typical industrial units, properly shielded, light large indoor areas and gynmasiums, for boxing, tennis, basketball, ice hockey and other indoor games.

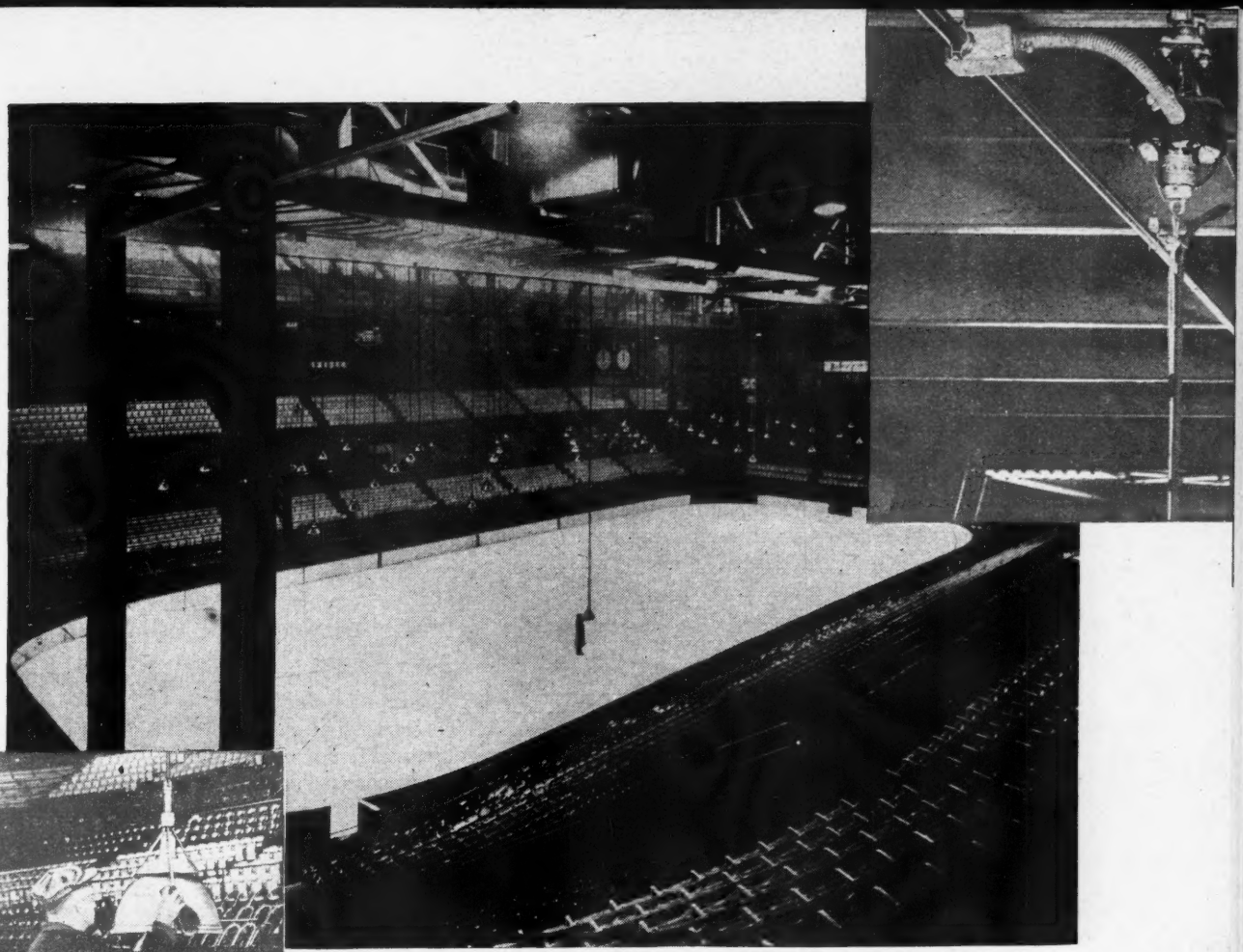
As in industrial and commercial lighting, the trend is toward higher intensities for night sports. Since most games involve speed, higher footcandle intensities to improve speed of vision are important. The illumination on a tennis court should be uniform, otherwise the ball will appear to go faster through the darker areas. This is also true in baseball. The object is also to light the underside of the ball as much as possible. Low mounted units which provide light on the bottom of the ball produce glare. This is typical of the problems encountered in providing proper lighting for sports.

Floodlights are used to illuminate the half-mile raceway track, Saratoga Springs, N. Y., used for night harness racing. This method of lighting eliminates obstruction to spectator's views, permits projection of light against progress of race, thereby highlighting the spectator side of the horse, sulky and driver, keeps all shadows under or behind the horse, and provides neat appearing installation. ***Lighting Equipment—General Electric Company, Schenectady, N. Y. Poles —Union Metal Mfg. Company, Canton, Ohio***

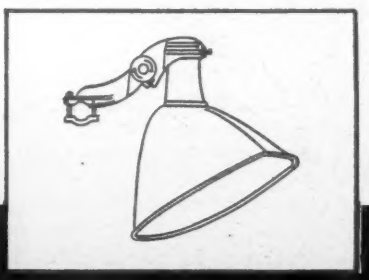
Six steel towers support 1245 floodlights 120 feet and higher above playing field to provide an intensity of 200 footcandles over outfield and infield alike, at Yankee Stadium, New York City. Each floodlight is equipped with a 1500 watt 105 volt lamp. ***Lighting Equipment—General Electric Co. Schenectady, N. Y. Electrical Contractor—. Fischback & Moore, Inc., New York, N. Y.***







Maintenance of lighting equipment is important on all types of installations. In the Cleveland Arena, disconnect type hangers permit reflectors to be lowered to the floor, where they can be cleaned and relamped easily and safely. Reflectors are supported on steel cable, with service wires attached to the steel cables at intervals for support. *Disconnect Hangers—Thompson Electric Co., Cleveland, Ohio*



Eighty 1500 watt lamps in large open type floodlights provide a minimum of 30 footcandles at any point on the Loyola University football field, New Orleans, La. Units are installed on ten poles, 5 on each side of the field, located 30 feet back from the sidelines. *Lighting Equipment—Benjamin Electric Mfg. Co., Des Plaines, Ill.*

LIGHT... for Study

FEDERAL control of non-housing construction in favor of a low-cost housing program continues to restrict the building of much needed new educational facilities. Facing increased demands for education, from veterans and grade pupils particularly, there is need for new facilities for study.

In new schools and old alike, one of the most important factors is modern planned lighting. Eyesight is precious, and should be carefully guarded, especially with children. Less than five percent of the youth entering school have defective vision. Yet, by the time the students finish high school, approximately 20 percent have contracted some form of eye trouble. The percentage doubles by the time the students leave college. From kindergarten through college seven pairs of eyes are impaired for each pair entering school with defects.

Eyesight can be conserved through better seeing conditions. Light is necessary for vision, and increased illumination, properly planned, enables students to see clearly, quickly and easily. Improper use of light, however, handicaps even those students having perfectly functioning eyes. It is therefore important that specialists, having full knowledge of what constitutes proper light for study, be consulted on lighting programs for the nation's schools.

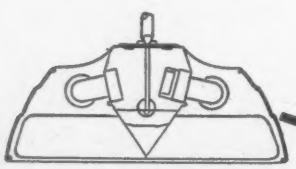
Probably in no other branch of the lighting art has there been as much study and research in the problem of visual environment as in the field of school lighting, or light for study. These researches are of a continuing nature, and involve not only illumination, but physiological and psychological factors, brightness ratios and general environment. Thus the problem of the lighting specialist is expanding into problems of reflection factors, finishes, colors, location of windows for natural light and ventilation, and similar factors. This research and study points up even stronger the necessity for close cooperation between the illuminating engineer, the architect, structural engineer, interior decorator, school board authorities, and the electrical contractor. All must work together, each with a complete understanding of the problem involved, in order to provide quality lighting efficiently and economically.

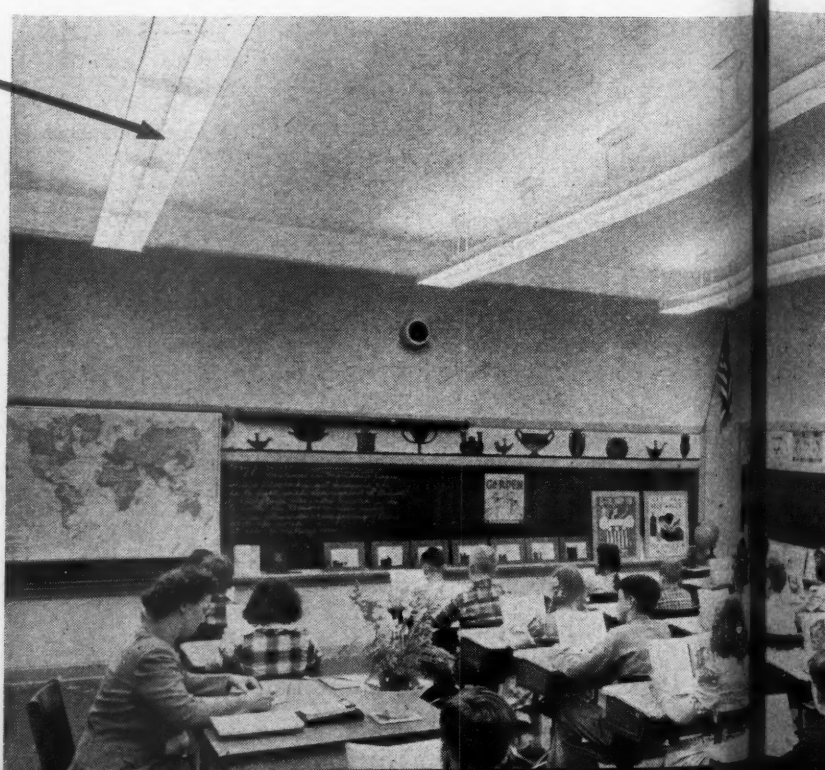
Proper light for study can be obtained with either incandescent filament or fluorescent lamps. As in many other fields of lighting, however, the trend is toward fluorescent light sources. The lower surface brightness of these lamps, their greater efficiency, and inherent low radiant heat emission contribute to higher levels of illumination without the disadvantages encountered with filament sources.

Totally indirect and luminous indirect luminaires provide proper light distribution, brightness control and absence of glare, for classrooms which have been finished with proper reflection factors of paint and finishes from ceiling to floor. It is most important that these units be properly maintained, as efficiency of an indirect lighting installation depends upon proper cleaning schedules and repainting of ceiling when its reflection factor drops as much as 15 or 20 percent.

Semi-direct and direct fluorescent lighting equipment provides quality illumination efficiently in classrooms which have been properly paint-conditioned. This type of equip-

(*Continued on page 96*)

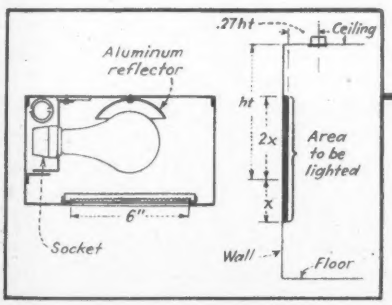


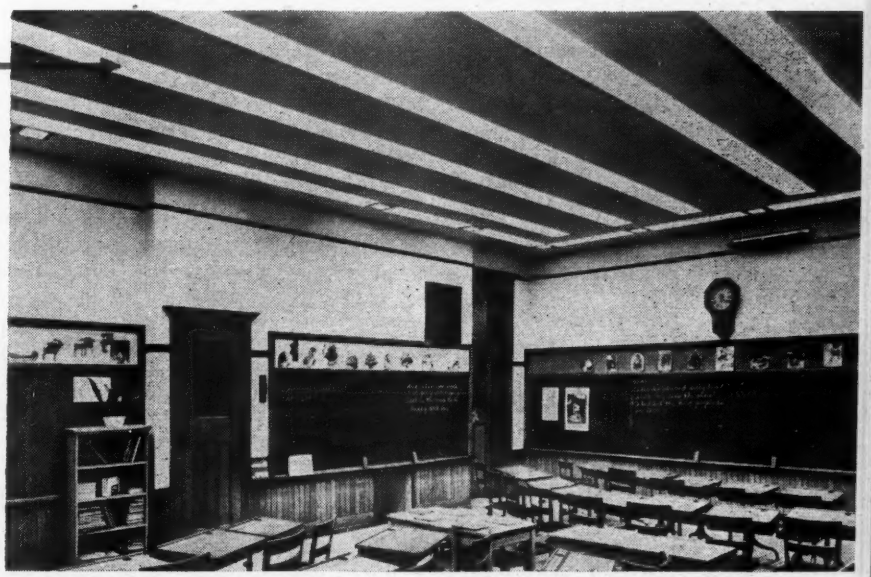


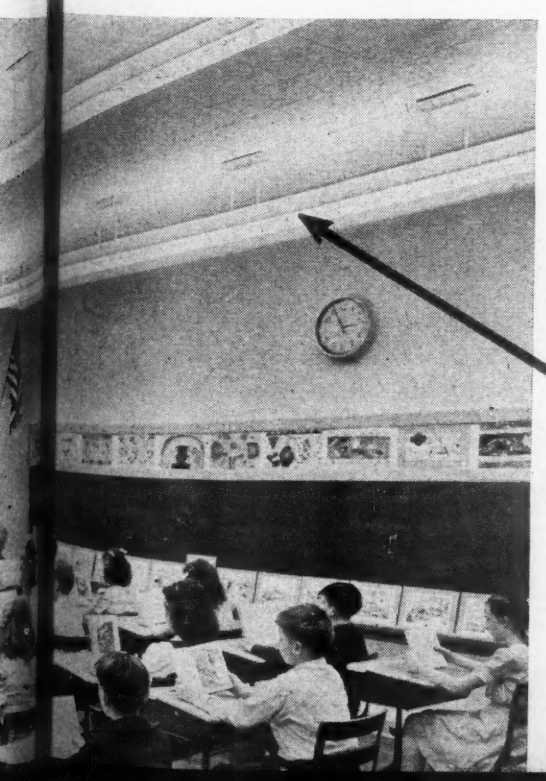
The Oxford Elementary School, Cleveland, Ohio, classroom shown here is lighted to an average intensity of 67 footcandles, designed for 50 footcandles maintained average on desks tops. Three rows of continuous two-lamp 40 watt fluorescent equipment, each 28 feet long, are spaced 8 feet apart, with outside rows 4 feet from side walls. Ceiling height is 12 feet, and the direct-indirect troughs are suspended 18 inches. The white acoustical tile ceiling has 75% reflection factor. The light green wall, dado, and tackboard area has 65% reflection factor. Trim on blackboard, chalk trays, windows and door is darker shade of green, with 35% reflection. Desk tops are natural light wood finish, non-glossy, and linoleum is brown. Light and paint have been planned for maximum comfort in seeing. ***Lighting Equipment—Curtis Lighting, Inct., Chicago, Ill. Electrical Installation — Maintenance Department, Cleveland Heights School System, Cleveland, Ohio***

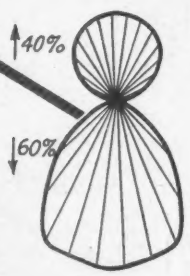
The Villa Maria Academy, Westchester, Pa., school lighting installation shown here was a modernization and relighting job. Woodwork, windows, floors, blackboards, even overhanging tree limbs outside the building, were altered as required to provide proper illumination, brightness control and elimination of glare. Chalk-boards have been finished mat-white, with which blue chalk is used, to remove unsightly light absorbing blackboards. A total of 24 twolamp 100 watt semi-indirect fluorescent units provide an intensity of 43 horizontal footcandles (initial) and 18 vertical footcandles, with a power consumption of 3.1 watts per square foot. *Lighting Equipment—Edwin F. Guth Co., St. Louis, Mo.*

A uniform maintained level of 25 footcandles of high quality lighting is provided on the desks of this fifth grade classroom in the Kensington Park School, Contra Costa County, California. Six 750 watt silvered bowl lamps in luminous fixtures provide this comfortable light. The luminous fixtures readily indicate maintenance needs by showing accumulated dirt. The ceiling is painted flat white, and sidewalls in a light color, to provide a high coefficient of utilization of the light produced by the lamps, and to maintain a comfortable brightness ratio throughout the room. Incandescent lamps of high wattage are satisfactory in classrooms when properly shielded and rooms are properly painted.









Blackboards in the Walker Elementary School, Flint, Michigan, are illuminated with 100 watt prismatic lens units installed flush in a troffer section. General illumination averages 65 footcandles maintained in service, produced by six continuous rows of single lamp 40 watt fluorescent troffers and a rectangle of the same type troffer around perimeter of room. *Blackboard Units—Holophane Company, Inc., New York, N. Y.*

LIGHT... for Study

Approximately 42 footcandles of illumination are provided in the General Chemistry Laboratory, Northwestern University Technological Institute, Chicago, Illinois. Standard two-lamp 40 watt industrial fluorescent units were used, installed on 7 ft. by 9 ft. 6 in. spacing. Lighting equipment is easily maintained, and is not affected by chemical fumes and vapors. Holabird and Root, Chicago architects, planned and specified this lighting. *Lighting Equipment—Benjamin Electric Mfg. Co., Des Plaines, Ill.*

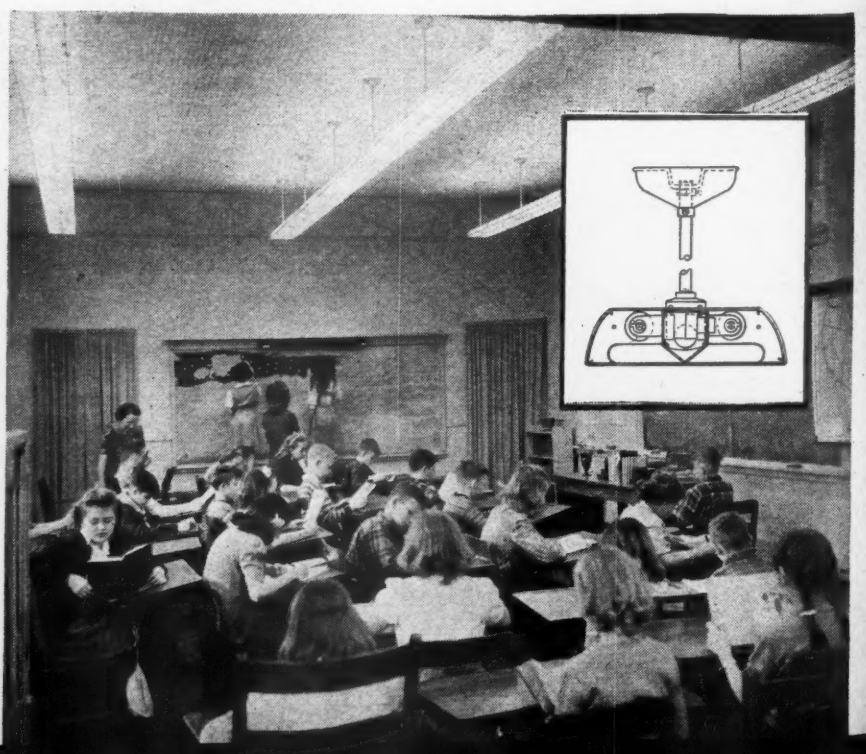
ment requires less maintenance than indirect types—at least, it is affected less by lack of maintenance. It should be adequately shielded to prevent direct glare from lamps or reflectors. Also, if louvers or shields are used to conceal lamps and reflectors from direct view in the line of vision, leaving bare lamps exposed to the desk tops, visual tasks, floors and lower portions of the side walls, intensities of 50 footcandles or greater should be maintained. This will minimize the reflections from the bare lamps exposed to these work areas, commonly referred to as reflected glare.

What constitutes proper paint-conditioning in the classroom? Study of recently lighted classrooms and model school rooms now under test shows a definite trend to much lighter finishes. All surfaces, ceilings, walls, floors, even furniture, are finished flat, rather than gloss or semi-gloss, which has been the practice in the past for furniture and lower wall areas subject to contact by pupils. Ceilings are usually finished white, with reflection factors of 80 percent and greater. The upper side walls and tackboards have reflection factors of 50 to 60 percent. Wood trim on chalkboards, tackboards, windows and doors are finished with paints having 30 to 40 percent reflection factor. Desk top reflection factors range from 35 to 50 percent, while dado finishes, floors and lower parts of desks have 25 to 35 percent reflection factors. Colors used seem to be of less importance, so long as their reflection factors fall within the above ranges.

Research on proper color and reflectance for chalkboards continues. Blackboards absorb too much light, and present too much contrast in the field of vision. A colored board, with approximately 20 percent reflectance is now favored. White boards increase light utilization, but colored chalks find disfavor with teachers and pupils alike.

Lighter colored paints and mat finishes have been arrived at by lighting men in search of an ideal visual environment for pupils who face greater critical visual tasks, both in severity and in duration than ever before. Medical men and educators have cooperated in this work. It is the clear cut job of practical lighting men to combine modern lighting techniques with improved environments to produce the best known conditions for comfortable vision for study.

Modernization of Kilby Training School, Florence, Alabama, consisted of relighting and painting of rooms to provide more efficient lighting and control of brightness ratios. Industrial type steel reflectors were replaced with modern semi-direct type shielded fluorescent continuous row units, each row containing two parallel rows of 40 watt lamps. Ceilings and doors were painted white, side walls green, and window facings a darker green. Only flat paint was used. Floor was also refinished in a lighter color. The result is a minimum of 50 footcandles of comfortable, glare-free illumination throughout each large room. *Lighting Equipment—F. W. Wakefield Brass Co., Vermilion, Ohio. Electrical Contractor—Wade Electric Co., Sheffield, Ala.*



BRIEF ARTICLES about practical methods of installation and maintaining electrical wiring and equipment and up-to-date estimating and office practices. Readers are invited to contribute items from their experience to this department. All articles used will be paid for.

Practical Methods

Cutout Switch Guards Sidewalk Elevator

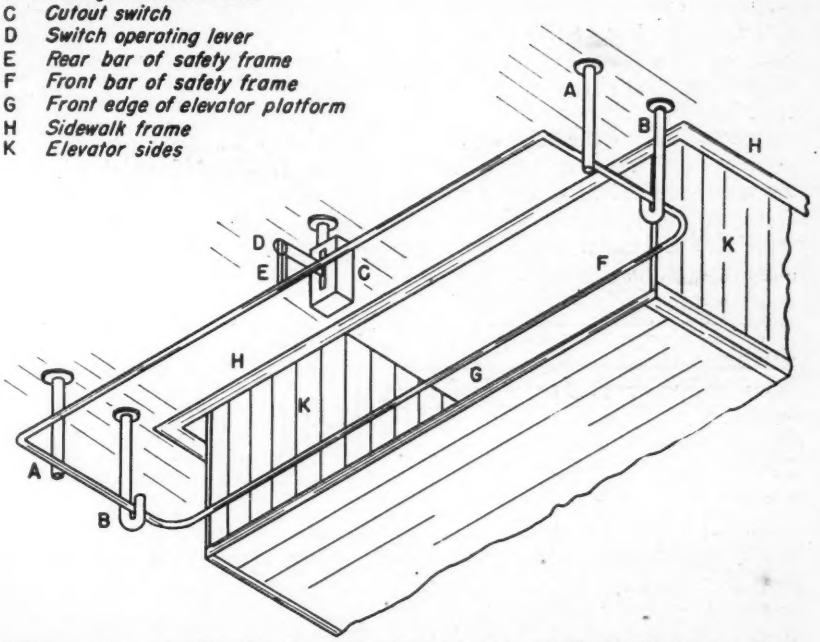
INDUSTRIAL

The invention of many mechanical and electrical labor saving innovations and practical safety features has been perfected by conscientious maintenance men. These men, recurrently in contact with the equipment they service, are in a logical position to observe operating characteristics and it is a tribute to this branch of service that many not only observe but also analyze, correct and improve the performance of their equipment.

Albert Baake, elevator mechanic in the maintenance department of the National Newark and Essex Building, Newark, N. J., is credited with the design and construction of several such applications.

Superintendent of National Newark and Essex Building, William Hancock, checks saturation of automatic floor selector traveling lubrication collar. Rising and falling with each trip of the car in the shaftway, the collar, with loose wicking material and treatment of oil, keeps even film of lubricant on vertical shaft. Albert Baake (standing), elevator mechanic and designer of lubricator, explains operation.

A *Ceiling mounted pivot*
B *Ceiling mounted cradle*
C *Cutout switch*
D *Switch operating lever*
E *Rear bar of safety frame*
F *Front bar of safety frame*
G *Front edge of elevator platform*
H *Sidewalk frame*
K *Elevator sides*



Oblique view of sidewalk elevator safety cut-out switch, looking upwards from basement level towards frame in sidewalk. Protruding freight on platform of car strikes front safety bar, raises it while forcing rear bar downward, and cut-out switch is activated through the toggle arm.

In the operation of sidewalk elevators, accidents have occurred due to freight overhanging the front, unprotected lip of the elevator platform and becoming jammed between the car floor and the underside of the sidewalk frame. This has resulted in strain and damage to both elevator equipment and the material being lifted and in a few cases, injury to personnel.

At the National Newark building a cut-out switch now prevents such occurrences, automatically interrupting the current if anything overhangs the lip of the car platform and stopping the car until the protruding object has been shifted to safety. The accompanying illustration visually pictures the switch in operation.

In loading the elevator, sides (K) prevent the freight from protruding out of the shaftway from sides and rear of the platform but the front remains unprotected. In the event of freight overhanging the forward edge of the car platform (G), the Safety bar (F) is raised, the toggle (D) is forced downward through lever action and the cutout switch (C) interrupts the current passing to the elevator motor.

Another useful maintenance hint is found in the high-rise elevator motor room. Lubrication of the moving floor selectors, rising and falling on their square steel shafts, has necessitated frequent attention. A light oil on the shaft has a tendency to run to the bottom, saturating the lower mechanism while leaving the upper shaft dry. A heavy grease is pushed to the upper and lower extremities of the vertical shaft, leaving the center dry. By attaching a loose square metal collar to the upper side of the traveling selector and loosely packing the space between collar and shaft with an oil saturated wicking material, the shaft is lightly lubricated each time the car rises or is lowered in the car shaftway. William Hancock, superintendent of the building, claims that lubrication is more effective, appearance is improved and the renewal of lubricant is less frequently required.

Employee Suggestion Contest Inaugurated

MANAGEMENT

The S. J. O'Brien Sales Corporation, New York City, has introduced an Employee Suggestion Contest as a means of stimulating employee suggestions and ideas to promote the welfare of the company.

All personnel, including department heads, office personnel, mechanics and maintenance men, are invited to participate in the contest for which prizes ranging from $1.00 to $100.00 will be awarded for suggestions accepted by a committee of three and put to practical use by the company.

In line with the company's feeling that most good ideas crop up during the working day, when employees are inspired to find easier and better ways to do things, or annoyed by things "somebody should do something about", every effort has been made to make the contest readily accessible to all employees. Special, numbered suggestion blanks are available in all departments and suggestion boxes, in which these forms may be dropped at any time, have been set up in strategic areas throughout the building.

Maintenance Control By Master Schedule

MAINTENANCE

Maintenance of electrical equipment at the Woodward Governor Company plant in Rockford, Ill., is based on what they term a "Routine Maintenance Loading Schedule." It is a master schedule, a large sheet containing 52 columns that covers a full year's operation.

Across the top of the sheet are listed the months of the year and the date of each week in the month. Listed in the various columns, under specific weeks of each month, and appearing at regular intervals across the sheet, are numerous code symbols which identify various motors, machines or equipment. Each code symbol identifies the equipment, type, location and type of service required.

For example: Symbol B-I-W appears 52 times across the sheet. This is a weekly inspection of the main transformer vault. The maintenance assignment includes recording the maximum temperature on each transformer; resetting pointer each time; checking oil level on each transformer and high voltage switch; and reporting any irregularity such as extreme moisture or temperature conditions in the vault. A second symbol K-O-V appears only four times on the Chart. This is for inspection of all air conditioning equipment motors every three

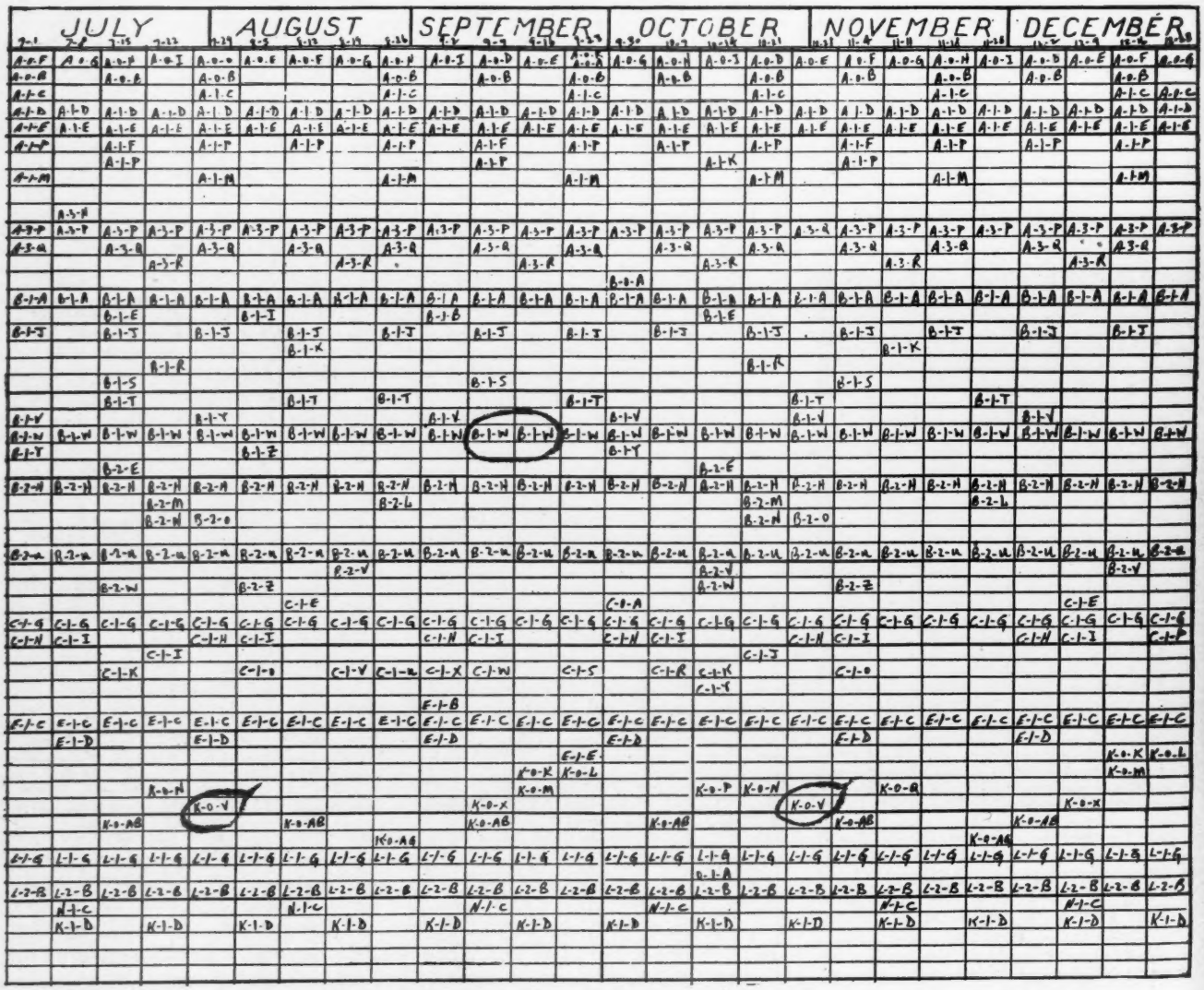


FIG. 1—Section of master maintenance schedule chart. Periodic appearance of code symbols in columns indicates maintenance interval for that specific equipment. Chart covers full year of operation and lists all plant equipment that requires routine electrical maintenance.

Get more *School Lighting Business*

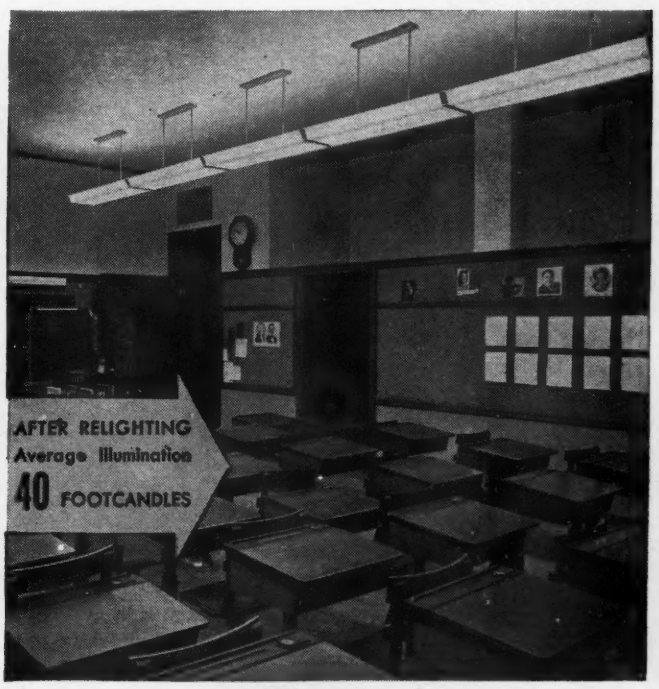
by making these simple tests

Westinghouse Lighting Engineers and school officials conducting classroom lighting test.

Tests by Westinghouse Lighting Engineers have revealed shockingly low levels of classroom illumination in otherwise progressive schools. These tests point the way to opportunities for electrical contractors to develop *additional* profitable business . . . by showing the need for improved school lighting.

Here is an example of what can be done. In a metropolitan school noted for its progressive educational methods, a simple test, made with ordinary light meters, was conducted by lighting engineers and school officials. The "Before and After" results are shown below. Classroom lighting was increased from the approximate national average of 3 to 5 footcandles, to modern recommended standards of 20 to 40 footcandles.

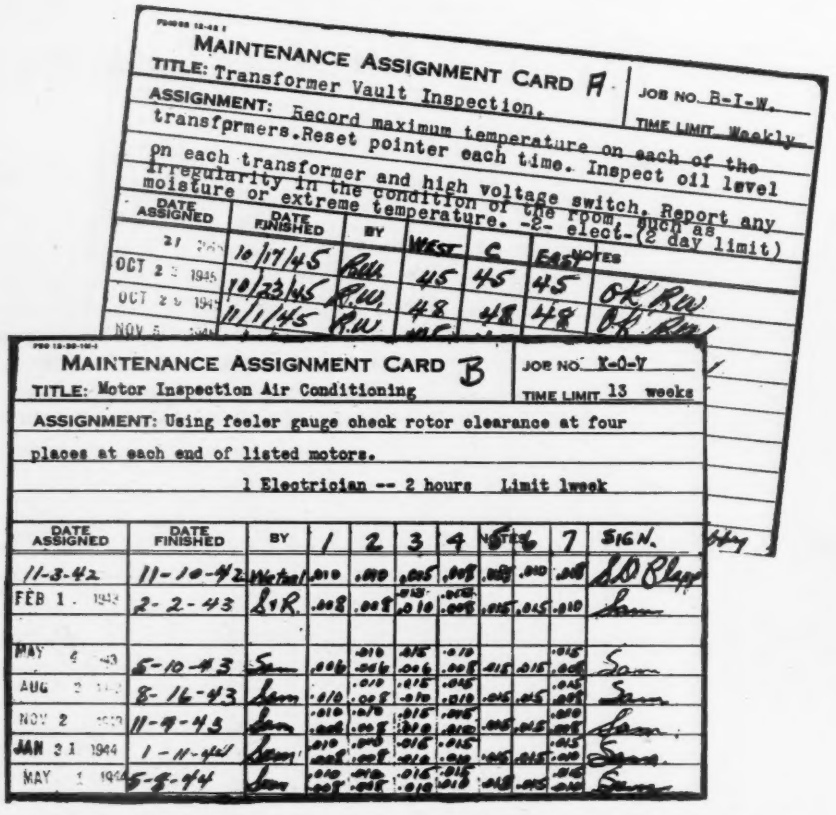
This and many similar tests indicate the very real need for public school relighting programs. Why not "spark plug" such programs in your area? Ask your Westinghouse Distributor for the new bulletin—"Planned Classroom Lighting". He has a Westinghouse-trained lighting engineer available to help you. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-04094-A



Westinghouse
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

PLANNED LIGHTING

AVAILABLE THROUGH 127 WESTINGHOUSE ELECTRIC SUPPLY OFFICES AND INDEPENDENT JOBBERS



MAINTENANCE ASSIGNMENT CARD A

TITLE: Transformer Vault Inspection. JOB NO. B-I-W. TIME LIMIT Weekly

ASSIGNMENT: Record maximum temperature on each of the transformers. Reset pointer each time. Inspect oil level on each transformer and high voltage switch. Report any irregularity in the condition of the room, such as moisture or extreme temperature. -E- elect. (2 day limit)

DATE ASSIGNED	DATE FINISHED	BY	WEST	C	EAST	NOTES
21	10/17/45	Rell	45	45	45	
OCT 2	10/23/45	R.W.	48	48	48	OK RW
OCT 2	11/1/45	R.W				OK RW
NOV 5						

MAINTENANCE ASSIGNMENT CARD B

TITLE: Motor Inspection Air Conditioning JOB NO. K-O-Y TIME LIMIT 13 weeks

ASSIGNMENT: Using feeler gauge check rotor clearance at four places at each end of listed motors.

1 Electrician -- 2 hours Limit 1week

DATE ASSIGNED	DATE FINISHED	BY	1	2	3	4	NOTES	6	7	SIGN.
11-3-42	11-10-42	Weber	.010	.010	.005	.008	.008	.010	.008	LO Rapp
FEB 1	2-2-43	L+R	.008	.008	.010	.008	.015	.015	.010	Sam
MAY 4	5-10-43	Sam	.006	.010 .006	.015 .006	.010 .008	.015	.015	.015 .008	Sam
AUG 2	8-16-43	Sam	.010	.010 .008	.015 .010	.015 .010	.015	.015	.015 .008	Sam
NOV 2	11-9-43	Sam	.010 .008	.010 .008	.015 .010	.015 .010	.015	.015	.010 .008	Sam
JAN 21 1944	1-11-44	Sam	.010 .008	.010 .008	.015 .010	.015 .010	.015	.015	.015 .008	Sam
MAY 1	5-8-44	Sam	.010 .008	.010 .008	.015 .010	.015 .010	.015	.015	.015 .008	Sam

FIG. 2—Maintenance assignment cards (A) for transformer vault and (B) air conditioning motors. Job number is symbol appearing on master chart. Maintenance instructions and interval as well as recorded data appear on cards.

months. This assignment also involves checking rotor clearances with a feeler gage at four-points at each end of the listed motors.

A maintenance assignment card is made out for each symbol on the chart. The card shows the job symbol; title identifying the equipment; the inspection interval; specific assignment instructions; and ruled columns for inserting assigned and completion dates, recorded data and signatures.

These cards are kept on file in the chief electrician's office. At the end of each week, he consults the master chart and notes all symbols appearing in next week's column. Cards bearing these symbols are removed from the file and placed in the "work assignment" racks of his maintenance crew. When they report the following week, their work is all laid out for them. No questions are asked. Assignment instructions and time limits are right on the cards.

Woodward has found this system to work especailly well. It gets down to the root of routine maintenance; it eliminates guesing and forgetfulness. Everything is down in black and white. Maintenance chores are done on clock-like regularity and production shut-down due to electrical equipment failure has been practically nil.

Wiring Automotive Service Stations

WIRING

The modern car is designed, constructed, tested, presented to the public, sold, serviced and repaired by electrically operated equipment. Cars are born on assembly lines that function due to efficient devices. Without the contributions of electricity, the automobile industry as we know it today could not exist.

Filling stations keep cars running by supplying gasoline from electrically driven pumps and air from electrical compressors. Service organizations rely on motor operated polishing buffers, grease guns and vacuum cleaners. For the convenience of both motorists and employees, the present day service center has a radio, fan, water cooler and unit heater.

Repair shops and garages enter the field of heavier equipment, utilizing the equipment of the motor shop as well as industrial trucks, overhead cranes, elevators, power presses, paint spray booths, explosion-proof equipment, special lighting and power operated doors.

Cars for civilian use are rolling from the plants at an ever-increasing tempo which means that many additional service stations will be necessary to keep the cars of the country moving. The auto repair business has never been more active because the increased age, mileage and deterioration of pre-war models creates a demand for more extensive maintenance. A check list of the electrical equipment used in show rooms, service stations, garages and repair shops indicates the necessity for aqequate wiring, controls and protective devices. As this important field broadens, opportunities for additional electrical contracting will correspondingly multiply. Knowledge of service requirements will result in a more satisfactory installation for the customer, more wiring and greater profits for the contractors.

CHECK LIST FOR WIRING GARAGES, SERVICE STATIONS, AND REPAIR SHOPS

- Air compressors, motor driven
- Alarm signal for garage entrance
- Automatic oiling devices
- Battery charging sets
- Brakes—electrically tested
- Buffing, polishing and grinding wheels on flexible shafts
- Conveyors
- Cranes
- Disc stoves
- Door opener and lock
- Drying oven
- Dynamometers
- Elevators
- Emery straps and wheels
- Enameling oven
- Fans, ventilating and exhaust
- Furnaces, annealing and enameling
- Generator and starter test benches
- Glue heaters
- Hammers
- Heaters
- Hoists
- Industrial Trucks
- Lamps, portable
- Machine tools
- Paint sprayers
- Piston grinders and refinishers
- Pumps for water, oil, gasoline
- Reborer and grinder
- Rectifier battery charging
- Riveting machines
- Sandblasting
- Saws
- Searchlights
- Signs
- Soldering tools
- Solution tanks, electrically heated
- Starting systems
- Tire inflaters
- Trucks
- Vacuum cleaners
- Valve grinders
- Varnish drying ovens
- Vulcanizers for tires and tubes
- Water coolers
- Welding apparatus

Recommended illumination intensities in footcandles:

Show rooms and display areas	30—75
Exterior general illumination	15—25
Repair shops, polishing booths	20—35
Garages	10—15
Offices	20—35

General Electric re-opens vastly expanded Lighting Institute as keynote of "Better Lighting" drive

WITH its formal rededication on September 11, the famous General Electric Lighting Institute at Nela Park in Cleveland is ready to resume its prewar role as "Lighting Headquarters of the World at the University of Light."

This re-opening is not merely a matter of "taking up where we left off." Former visitors will find that the New Institute has taken a gigantic step ahead, with sweeping improvements in buildings, equipment, displays and demonstrations.

Training courses at the Institute use the most advanced educational techniques to speed the flow of information on lamps and lighting to consumers. New facilities have been added to make visits to the Institute more helpful to public utility representatives, lamp distributors, electrical contractors and other groups directly concerned with lighting sales.

The New Institute—serving as the nerve-center of America's lighting education—is a part of the General Electric Lamp Department's biggest program to promote Better Lighting for every commercial, industrial and home purpose.

This program concerns you . . . **because it ties in directly with your own selling activities.**

➡ *So... turn the page and see how...*

G-E Lamp Campaigns help

1

"SEEING IS THE BIGGEST THING IN SELLING"

THE ELECTRICAL CONTRACTOR is the "key man" in General Electric's big comprehensive Store Lighting campaign. Through a series of four special meetings, now being presented in principal cities through the country, General Electric is giving contractors the facts, figures, ideas and selling tools they need to cash in on this profitable business. Here's a complete packaged program that will help *you* take full advantage of today's pent-up commercial lighting market. Remember...8 out of 10 stores are live prospects for modern lighting This important G-E Lamp promotion clicks, because it brings you all the market information, training courses, sales aids and direct mail needed to do the whole job...from educating salesmen to closing the business.

2

COMPLETE LIGHTING SALES TRAINING

Developed in cooperation with the LaSalle Extension University, this unique General Electric program is designed to help you build the effectiveness of your sales force in selling Store Lighting, Industrial Lighting, Office and School Lighting and Home Lighting. Each course includes complete textbooks which explain the most successful methods for developing and closing lighting sales in the particular field covered

3

"STAY BRIGHTER LONGER!"

This isn't just a slogan—it's the guiding principle behind all G-E Lamp Research—to give the consumer more and more light for his money. "Stay Brighter Longer!" runs through all General Electric lighting promotion, but it is given full-page, four-color prominence in a lively series of national advertisements designed to catch the eye of everyone who buys household lamps. These appealing messages build wider acceptance for the G-E Lamps you sell.

and

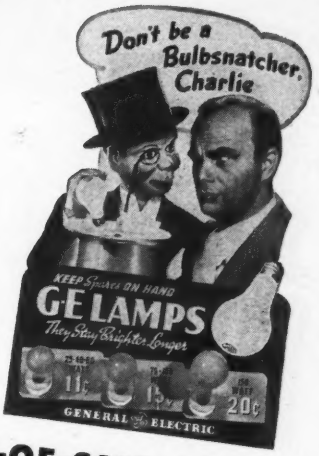
you sell Better Lighting!

4

BULBSNATCHERS . . . CAUGHT IN THE ACT!

Those empty light sockets—millions of 'em—still constitute one of the biggest challenges in the promotion of Better Lighting. By dramatizing the potential consequences of bulbsnatching—inconvenience, eyestrain and accidents—G-E gives consumers a powerful incentive to keep sockets filled with right-size bulbs. And this fall G-E Lamps is adding new popular appeal to this campaign by presenting leading comic stars of radio and screen in a series of hilarious bulbsnatching situations on the pages of Life, Saturday Evening Post, Collier's, Look and Liberty.

5



POINT-OF-SALE PROMOTION

The real follow-through of General Electric's campaign to fill empty light sockets takes place right at the dealer's counter, where full-color bulbsnatching displays tie in directly with national advertising to remind customers that *now* is the time to stock up on G-E Lamps. This is typical of all G-E Lamp campaigns. Effective dealer tie-in materials are always provided to give impact at the point-of-sale.

6

"YOUR PLACE IN THE SUN"

Later this fall G-E Lamps will launch its most aggressive home-lighting campaign in years—another step in the long-range program that made such important headway with "Better Light—Better Sight." "Your Place in the Sun" is a comprehensive promotion which ignores none of the possibilities of today's home lamp market. Besides lamps for illumination, it includes other money-makers such as infra-red, germicidal and sun lamps. "Your Place in the Sun" will be ready to go in November, with plenty of motion pictures, slide films, sales training courses, new literature and other sales aids to make it a "must" in your home-lighting promotion schedule.

behind all these promotions is . . .

G·E's Complete Line of Lamps

GENERAL SERVICE
3-LITE
GERMICIDAL
INFRA-RED
SUN LAMPS
SLIMLINE
CIRCLINE
FLUORESCENT
REFLECTOR
SILVERED BOWL
STREET LAMPS
NIGHT LAMPS
MOVIE PROJECTION
MERCURY
PROJECTOR
MINIATURES
SPECIALTIES

NO LIGHTING JOB CAN BE BETTER THAN ITS LAMPS—and it's the continuing aim of G-E Research to lead the way with an ever-increasing line of high quality lamps for all purposes . . . lamps made to *Stay Brighter Longer*.

***COMPLETE SPECIFICATION DATA AND HELPFUL LIGHTING IDEAS** are available on every line of G-E Lamps for every major field of application. Call your General Electric Lamp Representative and tell him what kind of information you need—he'll get it for you.

G·E LAMPS

Constantly improved by research to

Stay Brighter Longer!

GENERAL ELECTRIC

THESE ANNOUNCEMENTS of new equipment are necessarily brief—for more detailed description, sizes, prices and other data write to the manufacturers' advertising department, tell them in what issue of ELECTRICAL CONTRACTING you saw the item and they will send full details to you.

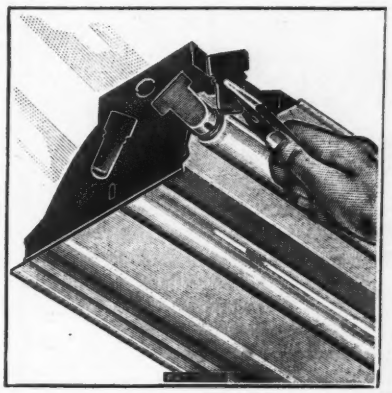
Equipment News

4 Pole Multi-Breaker

SQUARE D MULTI-BREAKER

A new four-circuit multi-breaker, known as MO-4, with both thermal and high speed magnetic tripping action has been developed. Designed especially to meet the heavy demand for multi-breakers for low cost housing and as load centers in farm electrification, the unit offers an assortment of branch circuit capacities of 15, 20 and 30 amperes. Two single poles can be converted easily and quickly to double pole for a two or three wire circuit. It is available for flush or surface mounting. The handle indicates the three positions, on, off and tripped. Unit contains no magnetic coils. No live parts are exposed in normal operation of the breaker or when restoring interrupted current. It is approved by Underwriters' Laboratories, and meets the requirements of the 1946 National Electrical Code which requires the installation of tamperproof circuit protection. Square D Company, Detroit, Mich.

Recessed Troffers



GUTH TROFFERS

New recessed troffers have been announced. Special knockouts in the ends make possible accurate 48 inch lengths. These knockouts permit lampholders to be inset in ends so that they are flush with the outside surface of the closed ends. They are built as complete units, ready to install. New quick mounting brackets simplify installation. Accessories include baffles, two types of eggcrate louvres, and both flat and formed-glass panels. Troffers are available in two types, deep types for one, two or three 40 watt lamps, and shallow types for one or two 40 watt lamps. Edwin F. Guth Company, 2615 Washington Blvd., St. Louis 3, Mo.

Electronic Intercom Unit

EXECUTONE STATION

New Model 1100 executive intercommunicating station has been announced. It includes a new patented audio-amplifier circuit, specially designed alnico speaker, life-time neon pilot lamp, and vinylite insulated moisture-proof interior wiring. Used in a system of twelve stations, this unit provides facilities for private, two-way voice communication with any combination of eleven other similar executive or staff stations. An automatic light signals when the station called is busy. However, any two stations in the system can carry on simultaneous private conversations. Executone, Inc., 415 Lexington Ave., New York 17, N. Y.

Switches

G-E SWITCH

A new line of oiltight and dustproof plugging switches for flange and surface mounting has been announced. The new switches are designed to remove plugging power from a motor at the correct moment, and to keep the motor from restarting in the reverse direction. The flange-mounted form is used for built in applications, while the surface mounted type is for general purpose use. Contacts are of silver. The switches are provided with grease-packed ball bearings for operating the shaft and magnet assembly. A lockout device can be provided which releases the lockout latch and permits normal operation of the switch when the motor is connected to the line. Maximum speed of the new switch is 1800 rpm. General Electric Co., Schenectady, N. Y.

SWITCH ON *The Eye Appeal*

and watch how Day-Brite Fluorescent Fixtures improve the appearance of store and merchandise. They're *optically engineered.*

May we send our new bulletin with complete details?

Day-Brite Lighting, Inc., 5401 Bulwer Avenue, St. Louis 7, Mo.
Nationally distributed through leading electrical supply houses.

In Canada: address all inquiries to Amalgamated Electric Corporation, Ltd., Toronto 6, Ontario.

The KINGSWAY

For surface mounting. Streamline fluted glass prevents glare. Luminous die-cast ends. Suitable for any length installation, in multiples of 2, 4 and 8 feet.

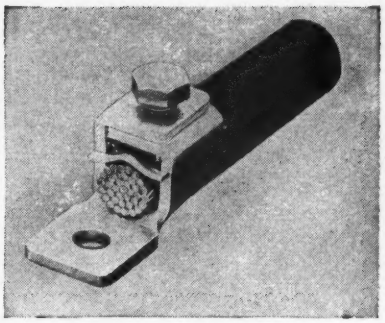
IT'S EASY TO SEE WHEN IT'S

DAY-BRITE

Lighting

908

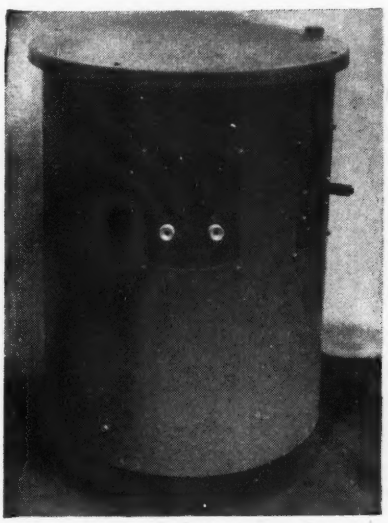
Solderless Lugs



BURNDY SOLDERLESS LUGS

A new large size Scrulug has been added to this line of solderless lugs. Known as the KPA34, it accommodates a range of wire and cable sizes from No. 4/0 wire to 500 MCM cable. It is installed by tightening the clamping bolt which forces a pressure bar upon the cable. A large range of wires and cables will be accommodated, but it was designed to have the operating characteristics of the largest cable. Lugs are formed from pure copper and brazed for added strength. Burndy Engineering Co., Inc., 107 Bruckner Blvd., New York 54, N. Y.

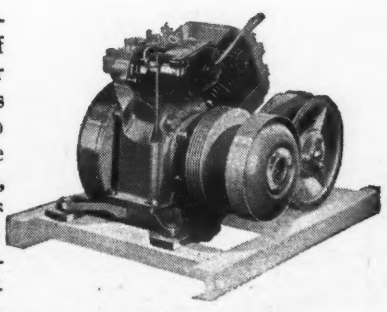
Mobile Brazer



WESTINGHOUSE BRAZER

Designed for general brazing service, a new 20 kva. portable brazer with water-cooled tongs has been announced. Enclosed in a circular steel housing, the unit is self-contained, having a contactor for energizing or de-energizing the brazing circuit, and adjustable heat brazing transformer, and a water-cooling system for the tong cooling water. A clamp type entrance bushing is provided on rear of the brazer for the incoming primary cable. Unit is for use on 220 or 440 volt power source. The control panel, built into the front of the brazer, contains a control switch, outlets for brazing cables, receptacle for foot switch pilot cable, and voltage tap changing plug. Transformer is air cooled by induced draft. Westinghouse Electric Corp., Pittsburgh, 30, Pa.

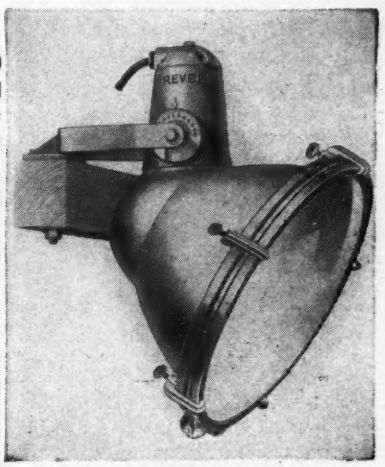
Power Package



SALSBURY POWER PACKAGE

The automatic operation of the principle of the adjustable diameter drive and driven pulleys linked by a V-belt to provide varying drive ratios in transmissions, is the heart of this power package. Automatic transmission consists of a variable diameter drive pulley, a variable diameter driven pulley, and a V-belt. These units form a coordinated assembly which gives automatic, infinitely variable ratios over a four to one range. Drive ratio is controlled as a function of driven shaft speed. The transmission may be originally assembled to limit the engine speed automatically to any desired value under normal operating conditions. The engine is a single cylinder, four cycle, air-cooled type, developing 6.5 hp. at 3200 rpm. Salsbury Motors, Inc., 4464 District Blvd., Los Angeles, Calif.

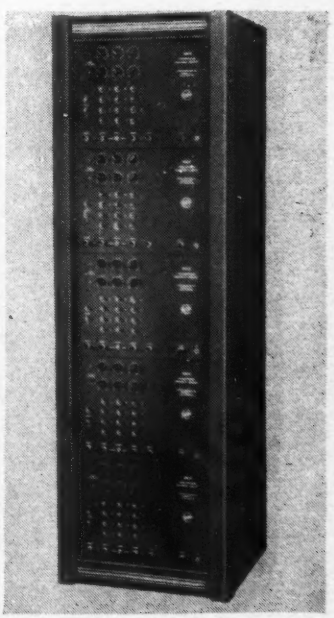
Floodlight



REVERE FLOODLIGHT

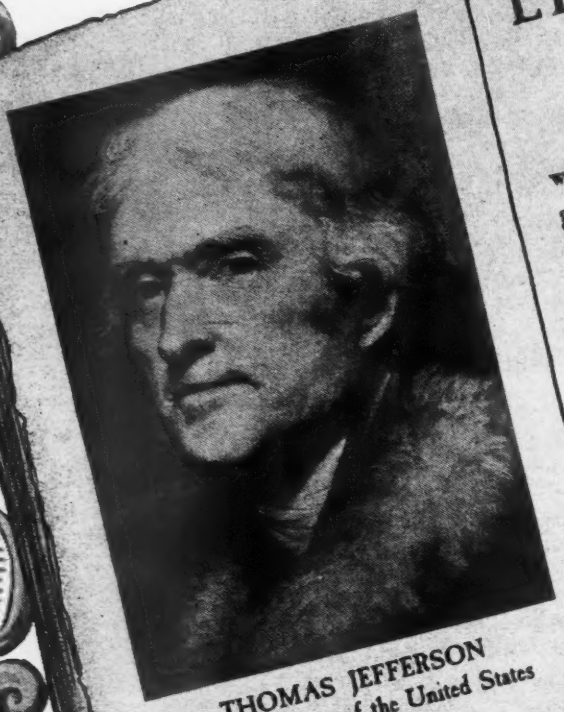
A new 750 to 1500 watt floodlight, called "Champion", is now available. It is of all aluminum construction. Unit is dust-tight and weather-proof. Lens is mounted in a cast ring hinged to the reflector and held in place by five "C" clamps. The reflector is attached to the cast aluminum housing by means of a heavy die-formed steel ring drawn tight to the housing by four screws. The mogul screw socket is attached to a removable cast cap and permits wiring without handling the entire unit. Among its advantages is a rotation feature that simplifies servicing. It is recommended for any large area lighting installation, such as railroad yards, service stations and sports fields. Revere Electric Mfg. Co., 6009 Broadway, Chicago 40, Ill.

Electronic Counters



POTTER COUNTERS

Designed to serve as a centralized control over a number of independent machine processes, this new electronic counter in multiple consists of five dual predetermined electronic counters. Three standard four tube decades are employed in Model 69–3. These decades are used in many fields for the precision control of time sequences of events; time interval recording; the counting of small objects; the counting of radiation particles, and the totalization of variable quantities from several independent channels. The output is provided with a single contact double throw high speed relay for initiating the control function. Potter Instrument Company, 136–56 Roosevelt Avenue, Flushing, N. Y.



THOMAS JEFFERSON
Third President of the United States
The Bettmann Archive

LEADERSHIP

Extracts from Jefferson's First Inaugural, 1801

"It is proper you should understand what I deem the essential principles of this government and consequently those which ought to shape its *administration* . . .

"Equal and exact justice to all men . . . Peace, commerce, and honest friendship with all nations . . .

"The support of the state governments in all their rights . . .

"A jealous care of the right of election by the people . . .

"The supremacy of the Civil over the Military authority . . .

"Economy in public expense that labor may be lightly burthened . . ."

1st in a series on Thomas Jefferson, Third President of the United States

Such wise and understanding Leadership continues to serve as an inspiration to those who keep faith with the enlightened principles pioneered by this great and true American.

With thoughtful appreciation, therefore, of the heritage attached to the name Jefferson, the founders of this company accepted it as best symbolizing their ideals and policies. Since then the Leadership of the Jefferson Electric Company, in its chosen field, has progressed through a consistent adherence to truth and dependability in all business transactions.

***TRANSFORMERS:** Power Circuit, Mercury Lamp, Oil Burner Ignition, Control, Bell Ringing, and Luminous Tube.*
***FUSES:** Jefferson-Union Renewable Fuses, Super-Lag, and Non-Renewable. BALLASTS for Fluorescent Lamps.*

JEFFERSON ELECTRIC COMPANY

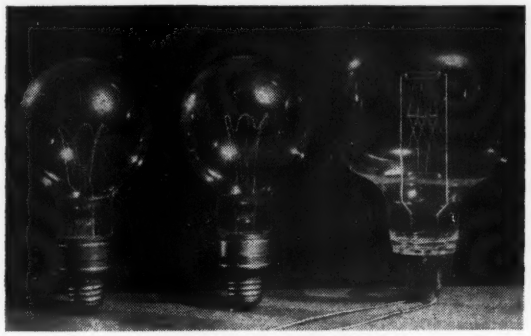
BELLWOOD, ILLINOIS *(Chicago Suburb)*

In Canada: Canadian Jefferson Electric Co., Ltd., 384 Pape Ave., Toronto, Ont.

JEFFERSON
ELECTRIC

Infra-Red Lamps

Three new infra-red industrial lamps have been announced. They are 250, 375 and 500 watt sizes. The two smaller lamps are designed especially for use in open reflector ovens and are interchangeable. Each has a medium skirted base and five inch light center length to fit infra-red reflectors in general use. The 500 watt lamps are equipped with medium bipost bases and six inch flexible leads. General Electric Lamp Department, Nela Park, Cleveland, Ohio.

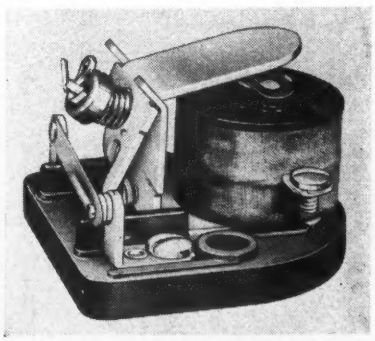


G-E INFRA-RED LAMPS

Fuse

The Trion is a dual-element fuse, which can be used at the same current rating as that of the motor or transformer it protects. It is designed to match the heat-absorbing capacity of the motor or transformer. It is claimed that this fuse allows a motor to start on the heaviest safe overloads, but blows before any harmful overload can occur, whether the motor is starting or running. It protects against singlephasing on polyphase motors, and against stalled rotor current in single-phase motors. It can be used with the pushbutton type of motor switch, at the same current rating as that of the thermal relay heater unit. It operates at 286°F, whether from its own heat, from surrounding heat, or from a combination of both, as in closed switch boxes. The Chase-Shawmut Company, Newburyport, Mass.

Motor Starting Relay



POTTER & BRUMFIELD RELAY

This new positive action motor starting relay, the MS2A, is voltage actuated and operates on the back E.M.F. of the starting winding. When the motor has attained speed this relay disconnects the starting coil from the line. It operates over a wide range of line voltage variations and is reliable on normally low lines with their heavier current flow, it is claimed. The relay may be mounted on the housing or at any distance, thus permitting operation of the motor in a combustible atmosphere. Potter & Brumfield Sales Co., 549 West Washington Blvd., Chicago 6, Ill.

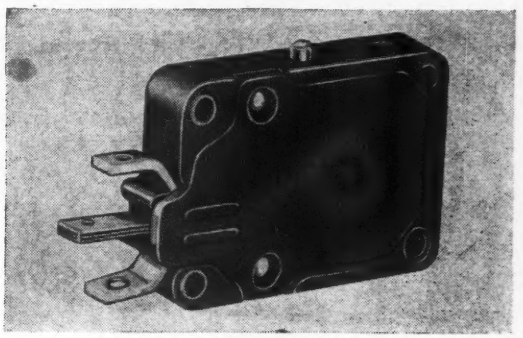
Safety Cap

AMERLINE SAFETY CAP

This new safety cap is of plastic, one piece construction, with beveled rim. It fits snugly the standard 110 or 220 volt openings, yet is easily removed. It is of crystal clear transparency and can be used to distinguish 110 and 220 volt openings. It is recommended for use in plants, mills, workshops, display rooms, schools, institutions, offices, as well as homes. It excludes line, dust, grit, moisture, which affect current flow. Amerline-Chicago, 1753 North Honore Street, Chicago 22, Ill.

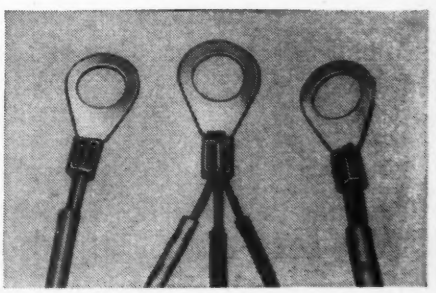
Miniature Switch

A new Model "M" rolling spring snap-action electric switch is available with improved structural features. Size of barriers between the terminals has been increased. To make wiring easier, heavier solder terminals are used with .082 inch terminal holes. It is made for single and multiple assemblies. Four of these switches can be mounted in a space of less than 1⅛ inches. It is made with single pole, single or double throw contacts and is rated at 10 amps., 125 volts a-c. Acro Electric Company, 1338 Superior Avenue, Cleveland 14, Ohio.



ACRO MINIATURE SWITCH

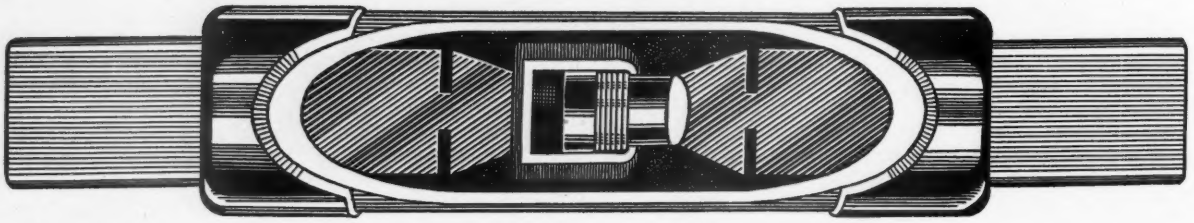
Terminals and Installation Tools



AMP TERMINALS

A new method for attaching solderless connections to solid wire, or a combination of solid and stranded wire, or stranded wire, has been developed. It is claimed that the mechanical connection made by the crimping operations withstands vibration and torsional twist. The conformation of the crimp for solid wire is such that no air space exists inside the terminal, making full surface area contact with the conductor. The crimped shape locates the solid conductor in a central position in the terminal barrel. Terminals and tools for wire sizes 22 to 10 inclusive. Aircraft-Marine Products, Inc., 1593 North 4th Street, Harrisburg, Pa.

Trion



THE DUAL-ELEMENT
TRIPLE-PROTECTION FUSE
WITH THERM-A-TRIP

SAVES YOU ITS COST BY ITS LOW WATT-LOSS

AND GIVES YOU MANY
OTHER ADVANTAGES

A fuse, like any current-carrying device, has resistance. And because of its resistance, it converts electrical energy into heat. Part of the energy passing through a fuse is thus lost; and as electrical energy is measured in watts, this loss is measurable as a watt-loss.

You pay for current by the number of watts used. The maintenance cost of a fuse as protection can therefore be determined by the watt-loss of the fuse. The lower the watt-loss, the more money you save. To come to the point at once, we present the watt-loss, as certified by the Electrical Testing Laboratories, Inc., of New York, for four different fuses, rated at 100 amperes, 250 volts. Fuse A had a watt-loss of 14.2; Fuse B, of 12.5; Fuse C, of 11.4; and a TRION fuse, of 8.5.

The difference is far from inconsiderable. When figured out as one of dollars and cents, it shows that in current saved, a TRION will soon pay for itself in cost of maintenance. And in a plant where many fuses are used, TRIONS will save, over other fuses, amounts running into thousands of dollars a year. It is just the same as with electric lights, or with any other consumption of electrical energy. If you can lower the watt-loss and retain the same efficiency, you get a lot more for your money.

And TRION saves you money besides that. It gives you more protection than any other fuse. On the opposite page, you will see how. And from us, or our representatives, you can get complete details, and graphs, and tables, substantiating these statements.

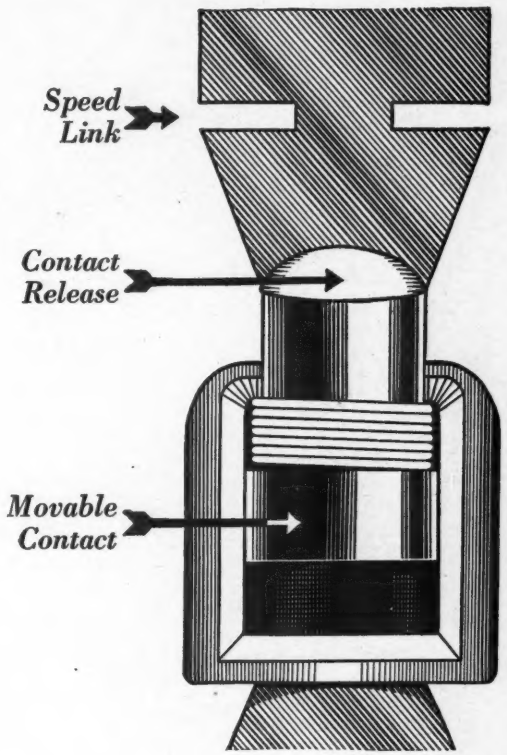
You should investigate TRION as an electrical protection before you make further fuse purchases. It is evident why — if you have read as far as this.

The Chase-Shawmut Company

Boston, New York, Syracuse, Cleveland, Philadelphia, Pittsburgh,
Baltimore, Atlanta, New Orleans, Dallas, Detroit

Trion

OPERATES INSTANTANEOUSLY ON SHORT CIRCUIT — KEEPS SWITCHES FROM OVERHEATING — REDUCES RATE OF RISE IN RECOVERY VOLTAGE — PROTECTS AGAINST SINGLE PHASING — ALLOWS MOTORS TO START AND RUN ON SAFE OVERLOADS — PREVENTS DAMAGE FROM HARMFUL OVERLOADS — 500° F. COOLER THAN A ZINC-LINK FUSE — AVERAGES FIVE TIMES THE TIME-DELAY OF AN ORDINARY FUSE.



When a short circuit occurs, one or more of the necks of the Speed Link are blown, instantaneously opening the circuit, and preventing damage to wiring or equipment.

TRION's Therm-A-Trip also opens the circuit when safe operating temperatures, whether surrounding or load, are exceeded. It matches its thermal capacity to the motor or transformer it protects.

When a safe overload is exceeded, the Therm-A-Trip, with its Contact Release and Movable Contact, absorbs heat, giving an extra long time-delay. Then the Contact Release melts, and the Movable Contact, driven by its heavy spring, opens the circuit with the efficiency of a circuit breaker.

FUSE ECONOMY WITH CIRCUIT BREAKER PERFORMANCE

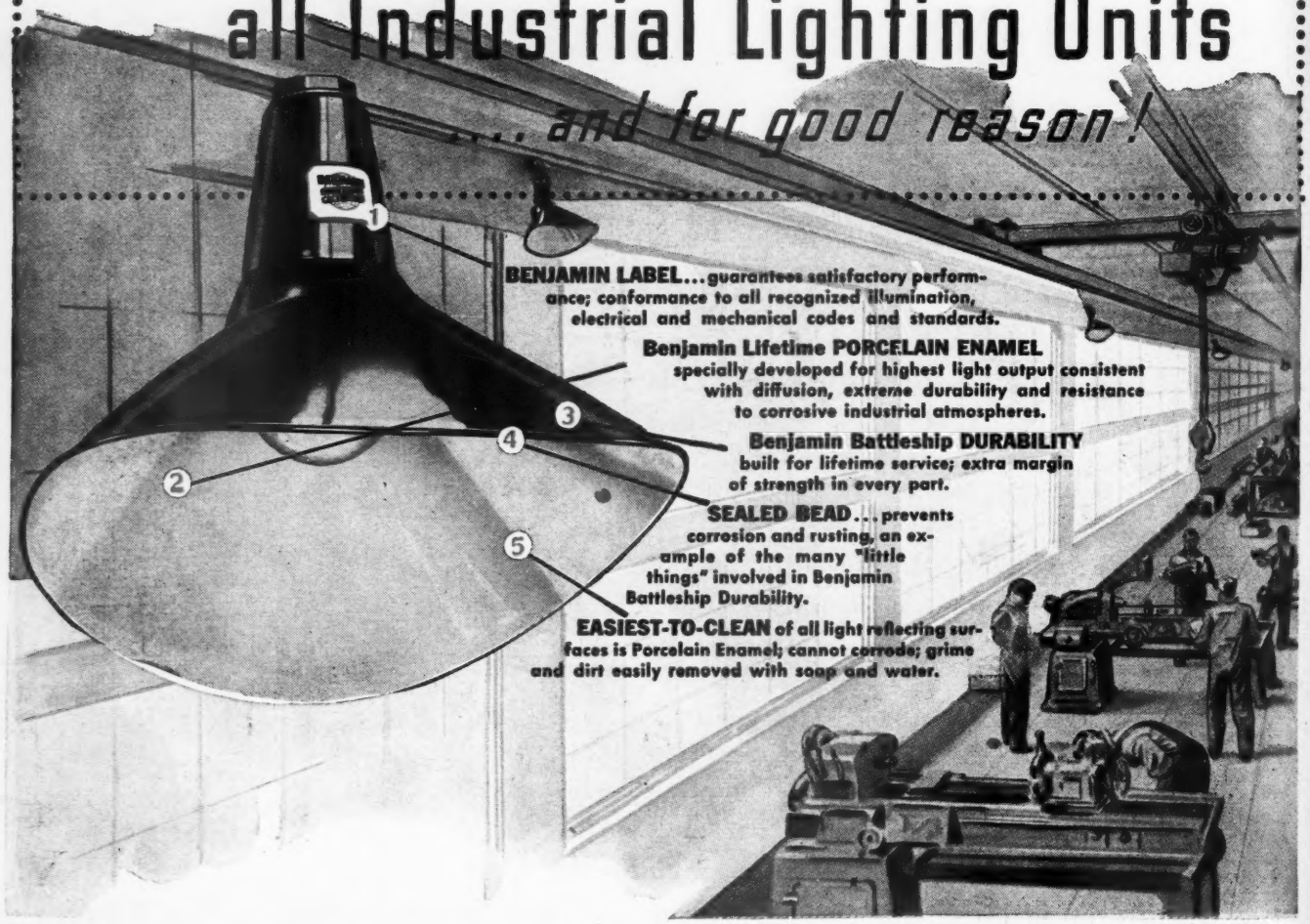
Write to us or ask our representative for full information about TRION, the fuse to use.

Newburyport, Massachusetts

Columbus, Indianapolis, Chicago, Omaha, Kansas City, St. Louis, Minneapolis, Denver, Los Angeles, San Francisco, Seattle

One of the Most Popular of all Industrial Lighting Units

... and for good reason!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2
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4
5
BENJAMIN LABEL... guarantees satisfactory performance; conformance to all recognized illumination, electrical and mechanical codes and standards.
Benjamin Lifetime PORCELAIN ENAMEL specially developed for highest light output consistent with diffusion, extreme durability and resistance to corrosive industrial atmospheres.
Benjamin Battleship DURABILITY built for lifetime service; extra margin of strength in every part.
SEALED BEAD... prevents corrosion and rusting, an example of the many "little things" involved in Benjamin Battleship Durability.
EASIEST-TO-CLEAN of all light reflecting surfaces is Porcelain Enamel; cannot corrode; grime and dirt easily removed with soap and water.

Benjamin Elliptical Angle Reflectors

Your Best Solution to Many Lighting Problems!
A Lifetime of Economical, Efficient and Trouble-free Service!

Thousands of industrial plants have found in the Benjamin Elliptical Angle Unit a most satisfactory and economical solution to certain special lighting problems quite commonly found in Industry. For this unit is especially designed for the lighting of many locations where overhead obstructions make overhead illumination difficult or unsatisfactory . . . for the lighting of locations where high ceilings may require special units for adequate illumination of the vertical surfaces . . . and for the localized lighting of many vertical areas where fairly large areas are involved, etc.

For complete details on these units (available in a wide range of sizes from 75 watt to 750-1500 watt), write for free Data Bulletin.

BENJAMIN ELECTRIC MFG. CO., Dept. H, DES PLAINES, ILL.

Specify **BENJAMIN** TRADE MARK

Elliptical Angle
PORCELAIN ENAMEL LIGHTING UNITS
Distributed Exclusively through Electrical Wholesalers

Fluorescent Lighting Equipment Maintenance

Types of starters and their care, and discussion of importance of efficient maintenance of lighting equipment, how to clean and service.

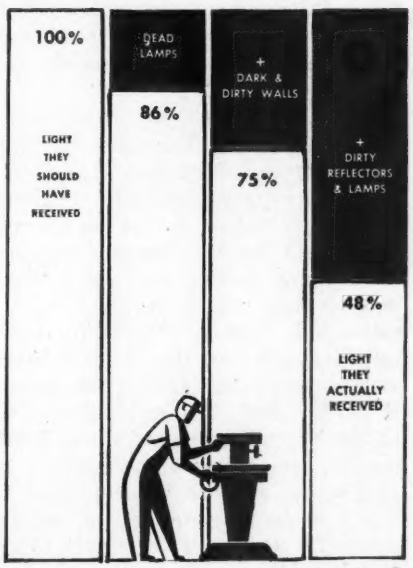
By Harris Reinhardt
Sylvania Electric Products, Inc.
Salem, Massachusetts

CHARACTERISTICS of fluorescent lamps, and how to maintain them properly in order to get the most out of them, was discussed last month. It was pointed out in that discussion that fluorescent starters are often the cause for improper operation of the lamps. A review of the types of starters available, their importance, and some of the danger signals to watch out for, therefore, is in order.

The fluorescent lamp starter is an automatic time delay switch. Any fluorescent lamp can be started manually, and this type starter is very simple. The impracticality of using manual starting for a large number of lamps is at once apparent; their use is confined almost entirely to applications such as desk lamps and portables, where it is easy to get at the unit, and only a relatively few units are involved. It has thus been necessary to develop automatic type starters, of which there are several types such as the magnetic type, thermal type, glow type and cutout type.

In manual starting a switch or pushbutton is connected in series with the two cathodes (electrodes) of the lamp. To start the lamp the line switch must first be turned on. The starter switch is then closed until the electrodes become heated, which takes only a few seconds. The starter switch is then opened to establish an arc through the lamp. Pushbutton switches which incorporate the line switch and the starter switch in a single unit have been developed, and are used primarily on desk and portable lamps, as previously pointed out.

The magnetic type starter was introduced during the early stages of fluorescent lamp and lighting development. It has since given way to the thermal, glow-type starters. It consists of contacts which are held in a closed position by a small spring when the lamp is not lighted, and which are opened when current starts flowing through a magnetic coil connected in series with the ballast.

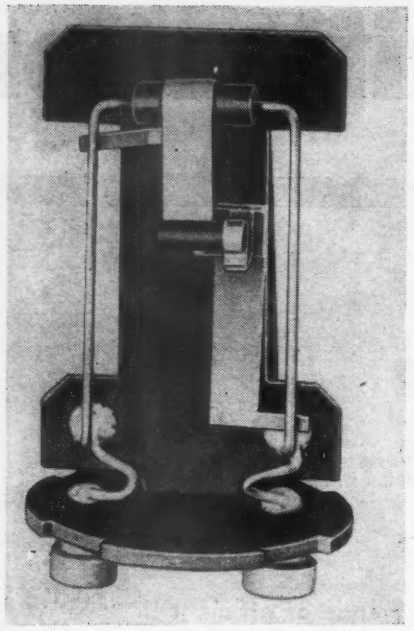


Improper maintenance in a typical industrial installation of fluorescent lighting resulted in a total depreciation of 52 percent. A proper maintenance program would more than double the amount of light actually paid for.

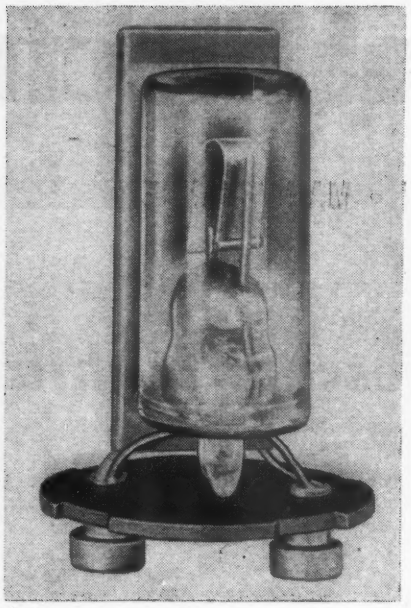
The thermal type starter makes use of a bimetal strip, heated by means of a small thermal element which is connected in series with the ballast in the same manner as the coil in the magnetic type starter. The bimetal strip consists of two thin pieces of metal welded together. The two metals expand at different rates when they are heated, causing the strip to curl, and this movement is used as a means of breaking the contacts in the starter.

The starter elements are enclosed in a small glass bulb and the contacts are set so that they are in a closed position when the lamp is cold. Preheating of the electrodes thus begins immediately when the line switch is closed and the starter is designed so that it takes several seconds before the heat generated is sufficient to cause the contacts to open. During the operation of the lamp these contacts are held in an open position by the heat generated in the thermal element, which is in series with the ballast and lamp, and hence carrying the full lamp current. If the lamps are momentarily turned off, it is necessary to wait until the strip cools enough so that the contacts close before the lamps will restart.

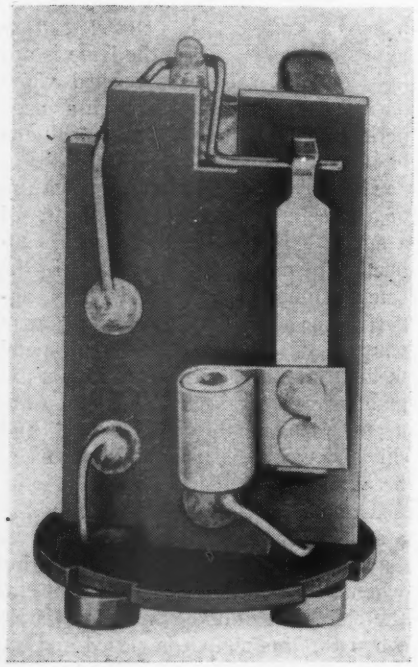
In the earlier types of fluorescent auxiliaries, starters of the thermal type were enclosed in the same case with



Thermal type starter, which makes use of resistance heat to operate a bimetal strip, which in turn makes and breaks current flow through filament cathodes.



Glow type starter also uses bimetal strip, for which heat is developed by an electrical discharge in a low pressure gas contained in the glass bulb of the starter.



Cut-out type starter employs a small heater coil in a ceramic tube, which activates a bimetallic latch, releasing a spring contact which breaks the circuit through the starter.

the ballast, and since the thermal element was connected in series with the ballast the whole unit became inoperative if the thermal element burned out or the controls got out of adjustment. Difficulties of this type soon made it obvious that the starter should be mounted in a separate and readily accessible location. This requires the use of four-contact starter sockets of the type usually used with starters of 100-watt fluorescent lamps.

Thermal type starters of the resistance-heat-operated type, which may be used in two-contact starter sockets, are so constructed that a bimetal strip rests on carbon contacts normally when no current is flowing. By closing the line switch, current thus flows through the lamp cathodes and through the point of contact between the bimetal strip and carbon contact. The flow of current through this contact heats the bimetal and causes it to break the contact, thus establishing an arc within the lamp.

The glow type starter also employs a bimetal strip. The heat for this strip is developed by an electrical discharge in a low pressure gas contained in a glass bulb. Current makes the gas, usually neon or argon, glow and the resultant heat causes the bimetal strip to make contact with silver contact, and thus preheat the lamp cathodes. When the bimetal strip makes contact the glow in the starter is extinguished. The resultant cooling on the bimetal strip causes it to break contact, and thus the lighting arc is established in the fluorescent lamp.

During lamp operation, the voltage across the starter contact is equal to the lamp's voltage. The gas pressure on the starter is properly regulated so that the glow discharge does not recur. Thus, the starter remains entirely out of the circuit. If the lamp fails to light on the first opening of the starter, or if the current is momentarily interrupted, the contacts in the glow tube are again subject to full voltage. This re-establishes the glow discharge and the starting cycle is immediately repeated.

Cutout starters are of both the resistance-heat-operated and glow types, and in addition to the starter mechanism include a circuit breaker consisting of a bimetal latch which is activated by a small heater coil in a ceramic tube. The tube is in physical contact with the bimetallic latch strip, and when repeated pulsations of current are passed by the starter switch in an effort to start the worn out lamp, the heater coil becomes hot and the heat is conducted through the ceramic tube to the bimetallic latch. This releases a spring contact, thereby breaking the circuit through the starter. When the burned out lamp is replaced the starter is reset by depressing a small push button.

A faulty starter can cause loss of efficiency and considerable shortening of flourescent lamp life. It may cause any of the following conditions:

a. Improper (either too long or too short) preheating time.
b. Repeated flashing of the lamp at each start.
c. The lamp blinking on and off.

Equipment Maintenance

Thus, with a knowledge of the operating characteristics of fluorescent lamps and their auxiliary equipment, it remains for the electrical contractor to keep lighting installations working at peak efficiency at all times by means of periodic maintenance and a careful check on all factors influencing the quality of light received from the lamps and fixtures.

Proper maintenance is essential not only in industrial plants, offices, stores, schools and hospitals, where continuous good lighting is needed for fast and accurate work, but it is equally important in restaurants, club rooms, theaters, beauty parlors and reception rooms, where an inviting atmosphere calls for modern lighting in perfect condition all the time, and in libraries and museums, where dependable, good lighting is very important.

Seven basic steps should be followed in maintaining an efficient installation:

1. Keep walls and ceilings painted in light colors.
2. Wash walls and ceiling regularly.
3. Check frequently with a light meter.
4. Check regularly for dead lamps.
5. Maintain voltage at proper level.
6. Keep extra replacement parts on hand.
7. Keep fixtures and lamps clean.

To illustrate how much improper maintenance can affect a lighting system it is interesting to study a typical industrial installation which indicates the surprisingly great effect of improper maintenance on operation. The number of unnoted dead lamps in this installation decreased the amount of light by 14%; the wrong color of paint plus dirt on the walls decreased it 11%; and accumulated dirt on the reflectors and lamp was responsible for loss of fully 27%. This made a grand total of 52% less light than the plant should have had. With proper maintenance, with prompt replacement of lamps and repainting and cleaning, this plant could have more than doubled the amount of light it was receiving.

Naturally, many factors influence the method of servicing and for this reason each individual installation requires special planning to determine the easiest and most efficient way of getting at the fixtures. A number of special devices are available which save time and simplify work. Several combination stepladders and lamp carriers, for intsance, which save steps and time, and reduce the danger of lamp breakage in handling, are now being manufactured. In some instances, traveling cranes can be used for fixture maintenance work. There should be an auxiliary platform so that the fixtures are, or can be, dropped to approximately 5½ feet above the platform. On this platform, workmen can easily do needed servicing of the fixtures. If a boom crane is available, a demountable platform may be built and installed on top of the crane for easy access to the fixtures.

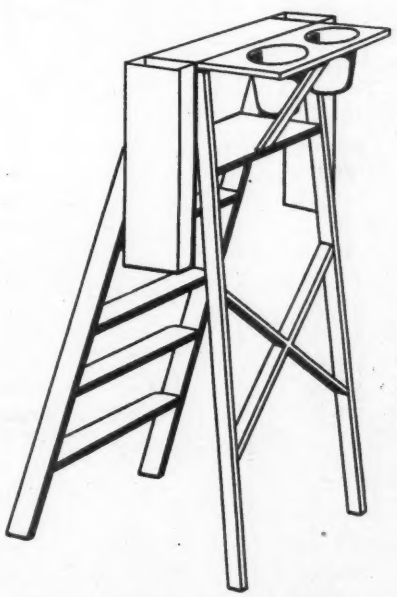
In many high-bay fluorescent installations, catwalks or trusses are provided for servicing of the fixtures. The reflector is pulled in toward the catwalk with a hooked lifting pole and held in place by hanger straps while needed replacements and cleaning are done.

The actual tools for proper cleaning and maintenance are simple enough—a light meter to determine the amount of light and the frequency of cleaning, a ladder or some means of getting to fluorescent fixtures, soap, water and rags or an automatic applicator such as a hand sprayer.

In cleaning porcelain enamel, it is usually safe to use any efficient cleaning solution that is concentraed enough to do the best and quickest job. However, for aluminum surfaces, the cleaning solution must be as neutral as possible because even a mildly alkaline or acid solution in time destroys their reflectivity. A green soap solution, or some of the special wax or wax emulsion cleaners which have been specifically developed for cleaning aluminum are recommended, for they leave a thin coat of wax on the surface which helps maintain high reflectivity. For synthetic enamels, however, a green soap solution is recommended to insure a clean surface. On glass surfaces, a trisodium phosphate solution is quite adequate, and no rinse is required as with other reflectors. Reflectors that are only slightly dirty can simply be rubbed with a damp rag.

Remembering that lamps must be removed before cleaning reffectors and that the lamps must also be cleaned, the following program proves useful in practically all installations. It calls for a two man team, and the secret of the success is based on the ease of removing reflectors and the interchangeability of reflectors.

1. Man on ladder removes lamps and reflector and passes them down to man on floor who in turn passes up a reflector previously cleaned.
2. Man on ladder secures clean reflector in place. Meanwhile, man on floor wipes off the two lamps which he passes back to man on ladder.
3. Man on ladder with pocketful of starters reinstalls lamps and sees that the fixture is working properly.
4. Man on ladder descends and puts ladder in place at next fixture.
5. Meanwhile, man on floor washes and dries the reflector from the first fixture and has it ready to replace the soiled reflector in the second fixture.
6. Repeat procedure throughout the entire area.



Easily built "all-purpose" maintenance ladder has spaces for burned-out lamps, new lamps, starters, cleaning cloths and two buckets—one for cleaning solution, other for rinse water.

Two men form an efficient crew for maintenance work. Man on ladder removes lamps and fixture parts, passes them down to man on floor, who in turn passes up clean reflector or parts previously cleaned. While man on ladder secures clean parts in place, floor man cleans lamps and passes them up for installation. Ladder is moved to next location while dirty reflector is being cleaned.

The frequency of cleaning depends entirely upon the location of the building and the type of work involved. Air filtered and air conditioned rooms, for example, may require cleaning of the equipment only once in six months, while cleaning may be necessary every few weeks in an atmosphere which is heavy with dust and oil. The best way to check cleaning frequency is with a light meter. Whenever the meter shows that the area is receiving one-fourth to one-third less light than it should, it's time for cleaning.

Provision for ease of maintenance when a lighting system is planned is important. The added cost of disconnecting hangers and devices, or of special catwalks or other servicing features can be easily justified, in that these devices speed up maintenance, save costly labor, and make it possible to get more light from the power consumed. Use of ladders on existing installations which have no such servicing features is more or less necessary. There are also many types of installations where disconnecting and lowering devices or other special provisions for servicing are not practical, and ladders offer a satisfactory solution to maintenance problems. But for new installations where machines or furnishings interfere with use of ladders, every consideration should be given to use of these special maintenance features.

DATA SHEET

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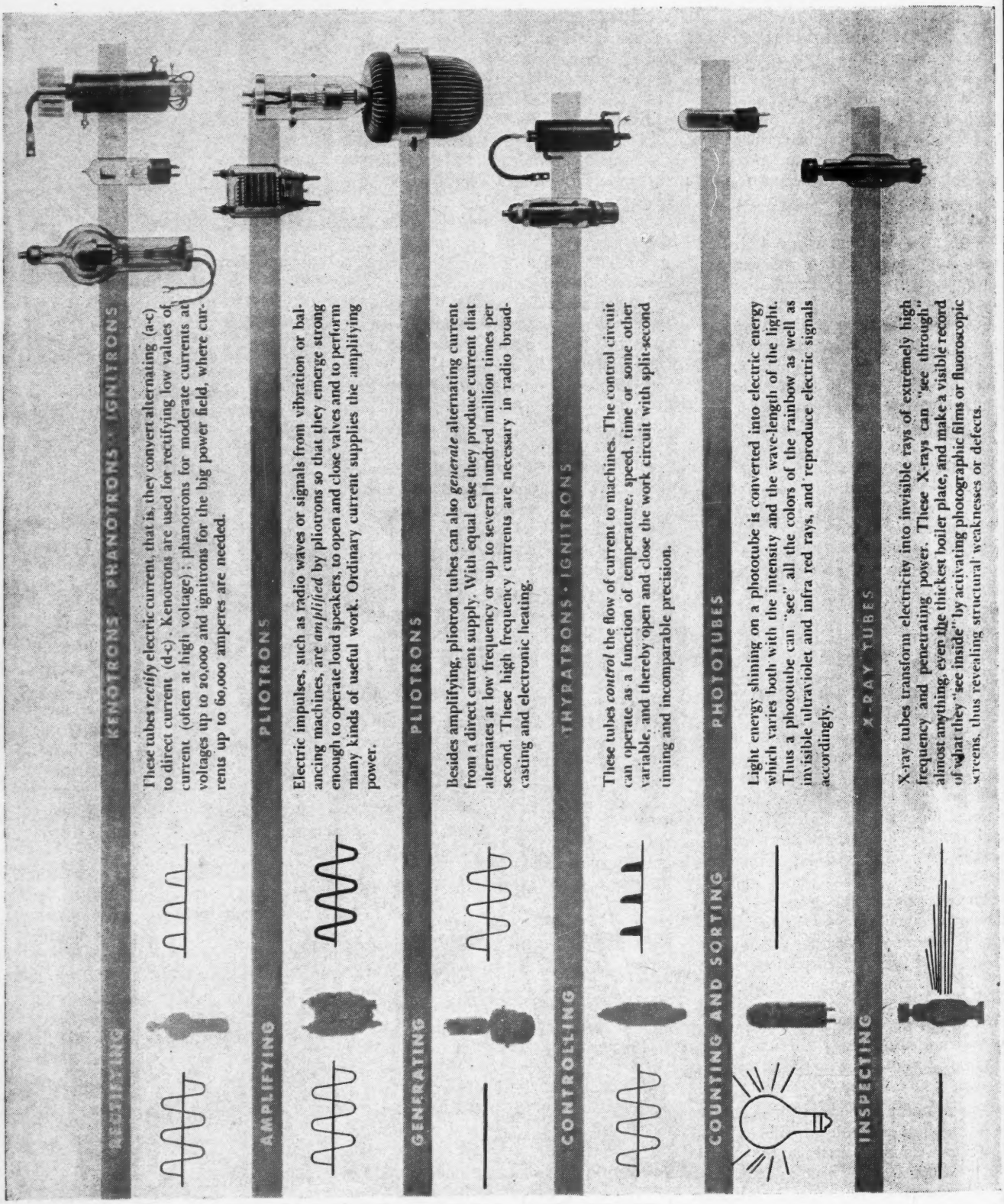
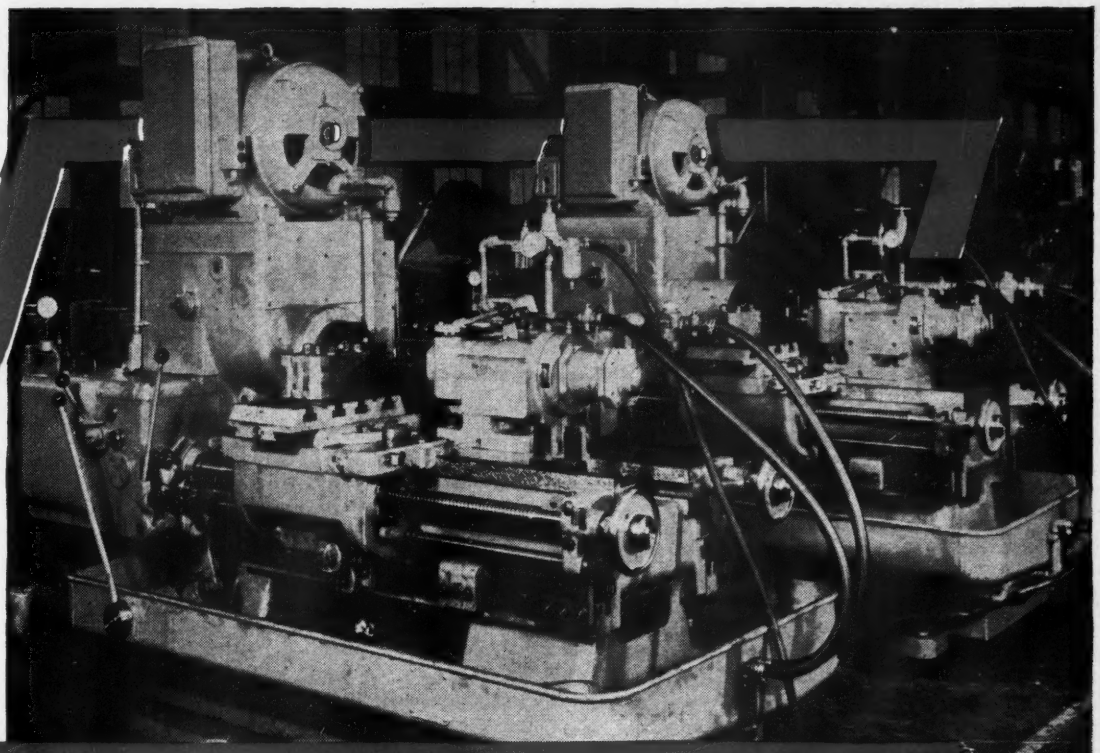
D-9

The Six Fundamental Functions of Electronic Tubes


RECTIFYING
KENOTRONS · PHANOTRONS · IGNITRONS
These tubes *rectify* electric current, that is, they convert alternating (a-c) to direct current (d-c). Kenotrons are used for rectifying low values of current (often at high voltage); phanotrons for moderate currents at voltages up to 20,000 and ignitrons for the big power field, where currents up to 60,000 amperes are needed.
AMPLIFYING
PLIOTRONS
Electric impulses, such as radio waves or signals from vibration or balancing machines, are *amplified* by pliotrons so that they emerge strong enough to operate loud speakers, to open and close valves and to perform many kinds of useful work. Ordinary current supplies the amplifying power.
GENERATING
PLIOTRONS
Besides amplifying, pliotron tubes can also *generate* alternating current from a direct current supply. With equal ease they produce current that alternates at low frequency or up to several hundred million times per second. These high frequency currents are necessary in radio broadcasting and electronic heating.
CONTROLLING
THYRATRONS · IGNITRONS
These tubes *control* the flow of current to machines. The control circuit can operate as a function of temperature, speed, time or some other variable, and thereby open and close the work circuit with split-second timing and incomparable precision.
COUNTING AND SORTING
PHOTOTUBES
Light energy shining on a phototube is converted into electric energy which varies both with the intensity and the wave-length of the light. Thus a phototube can "see" all the colors of the rainbow as well as invisible ultraviolet and infra red rays, and reproduce electric signals accordingly.
INSPECTING
X-RAY TUBES
X-ray tubes transform electricity into invisible rays of extremely high frequency and penetrating power. These X-rays can "see through" almost anything, even the thickest boiler plate, and make a visible record of what they "see inside" by activating photographic films or fluoroscopic screens, thus revealing structural weaknesses or defects.

Data from Westinghouse Electric & Mfg. Co.

30
HP
3600
RPM



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QUESTIONS from readers on problems of industrial equipment, installation, maintenance and repair. Answered by electrical maintenance engineers and industrial electrical contractors out of their experience. For every question and every answer published, we pay $5.00.

Reader's Quiz

Control for Cranes

QUESTION 226—In our machine shop we have a high center bay with two crane ways. The upper craneway has two slow speed heavy duty cranes and the lower craneway has four high speed light duty cranes. We have had several accidents due to a lower bay crane hitting the cables of the lowered hook on an upper bay crane when working in the same area on different jobs. We feel that the operators and riggers cannot be held totally responsible for these accidents without some kind of warning device to indicate that two cranes on different craneways are approaching the same area. It is considered that the warning device should be in both cabs concerned (perhaps I should say all crane cabs concerned since more than two cranes could be involved). All three cranes are 3 phase 220 volt with conventional trolley wire service, and they are all operated from a cab hung below one end of the crane. I would like to know if any reader can suggest a suitable control scheme that would warn the operators of approaching danger. —R.E.

A. TO QUESTION 226—A simple and inexpensive method of signaling the approach of an overhead traveling crane may be had by installing a system of floodlights. With two floodlights installed on each crane, and directed to shine into the cab of the crane to be signaled, would give warning of the approach of another crane. The floods on the cranes in the high bay would be directed down at angle to shine in the cabs of the cranes in the lower bay, allowing a safe distance between cables at the time of warning, and attracting the attention of the riggers as well as the operators. The floods on the cranes in the lower bay would be directed upward at angle to signal the operator in the cab of the crane in the high bay. These floodlights could be of the 110 volt type connected in series with a spare auxiliary contact on the travel contactor and across one phase of the 220 volt 3 phase supply, in this way the floods would come on when the crane started to travel and would remain on while the crane was traveling.—T.O.B.

A. TO QUESTION 226—To solve this problem no doubt it is best to go into the field of electronics.

If the upper and lower cranes pass each other, double the equipment mentioned would be used in order to give a signal when approaching a crane from either side.

Install an electric eye and sensitive element on each crane. Each electric eye is focused on the sensitive element of the crane that works in the same area. This equipment can be made to operate a signal at any predetermined distance thought advisable.

The signal can be a light, a bell or even cut off the power from each crane if the crane has magnetic controls.

If one crane passes the other, the electronic equipment could be installed at an angle in order for one to pass the other in which case the elements would be in focus for only an instant but long enough to operate a relay which in turn would close the circuit to any form of signal you wish to use. In this case the relay should be the mechanical latch type in order to maintain the signal after the elements are out of focus. The operator would release the relay latch after he has recognized the signal.

This scheme of control can be engineered by any manufacturer of electronic equipment.—B.A.S.

Design Data for An Autotransformer

QUESTION 227—I want to build an autotransformer with 220 volt primary, 5 amps. primary current and voltage taps to be taken off at 210, 200, 185, 165 and 150 volts. How should this autotransformer be designed?—F.H.S.

A. TO QUESTION 227—In designing a single-phase autotransformer which will give satisfactory results under normal operating conditions, the following step-by-step method may be used:

1) Calculation of Total Flux—

Let VA = Capacity of the autotransformer in volt-amperes
= Impressed voltage × line current
= 220 volts × 5 amps
K = A constant
= 1.5 to 2.5 for good sheet steel
= 3.0 to 4.5 for poor quality sheet steel
f = line frequency in cycles per second
= 60 cycles per second

then, Total flux = $F = K \times (VA/100f)^{\frac{1}{2}} \times 10^6$
$= 2.5 \times (220 \times 5/100 \times 60)^{\frac{1}{2}} \times 1{,}000{,}000$
= 339,250 lines.

2) Calculation of Required Iron Core Cross-section—

Let A = cross-section of iron core in sq. in.
B = Flux density in iron core in lines per sq. in.
= 54,000 lines per sq. in. for air-cooled transformer

then, Core Area = $A = F/B$
$= \frac{339{,}250}{54{,}000}$
= 6.25 sq. in. or 2.5 in. by 2.5 in.

3) Calculation of Primary Turns—

The number of turns in the primary,

$N = \frac{\text{Volts} \times 100{,}000{,}000}{4.44 \times 60 \times 339{,}250}$
= 247 turns.

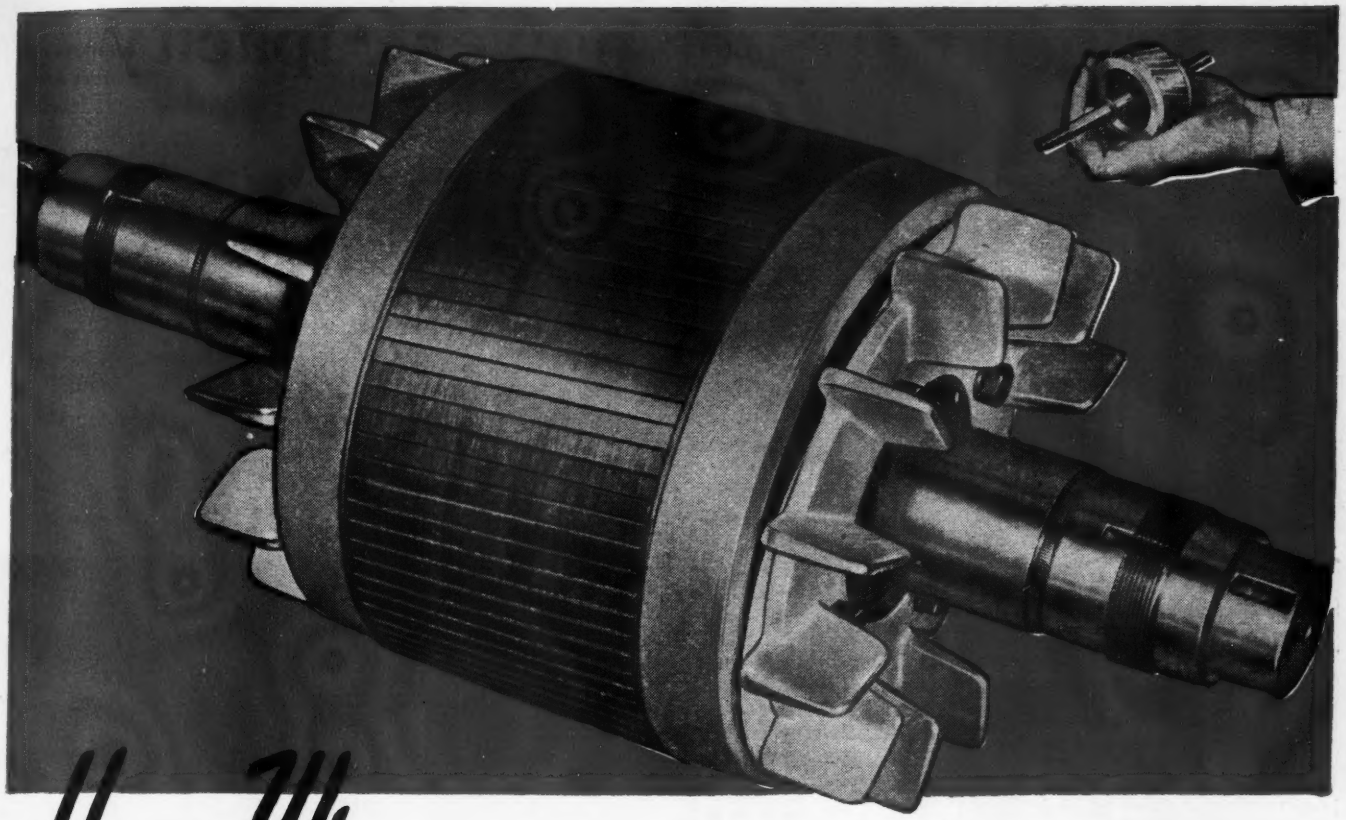
4) Calculation of Magnet Wire Size—

Allowing 750 circular mils per ampere, the proper size of magnet wire to use for a 5 amp. rating will be:

q = Amps. × circular mils per amp.
= 5 × 750
= 3750 circular mils or No. 14 wire with a cross-section of 4107 circular mils can be used.

5) Calculation of Secondary Taps—

The secondary taps may be taken at points corresponding to the ratio of voltages. The number of turns per volt = $\frac{247 \text{ turns}}{220 \text{ volts}} = 1.12$. The taps



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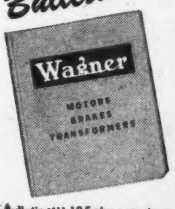

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M46-20

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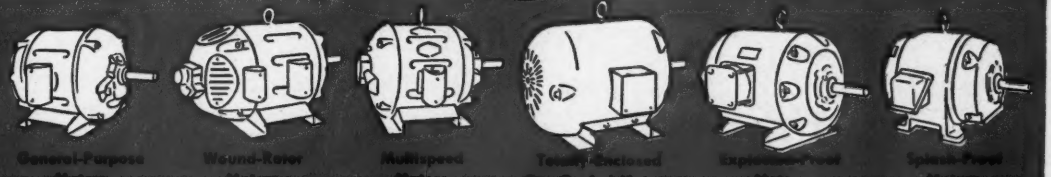
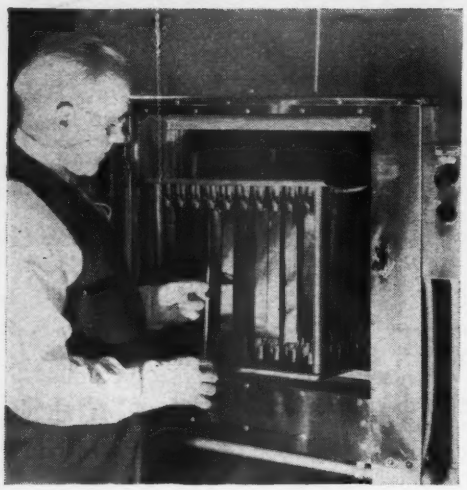
Wagner Electric

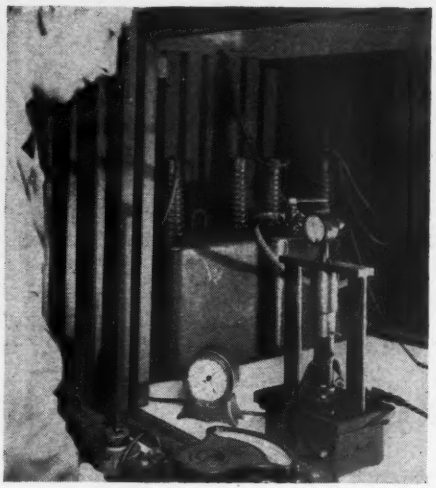


If you need greater power capacity but have limited space . . .

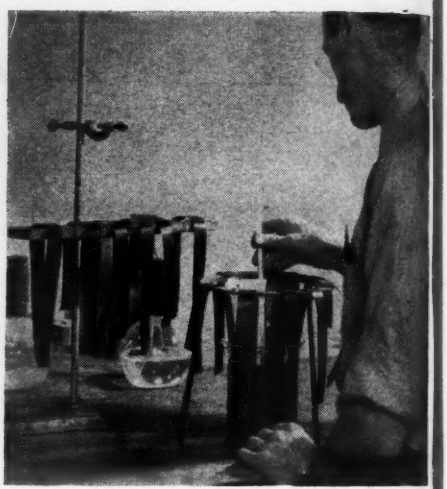
Use these improved U·S·S American Varnished



Greater heat resistance. Precisely controlled ovens subject varnished cambric to aging tests far in excess of normal requirements.

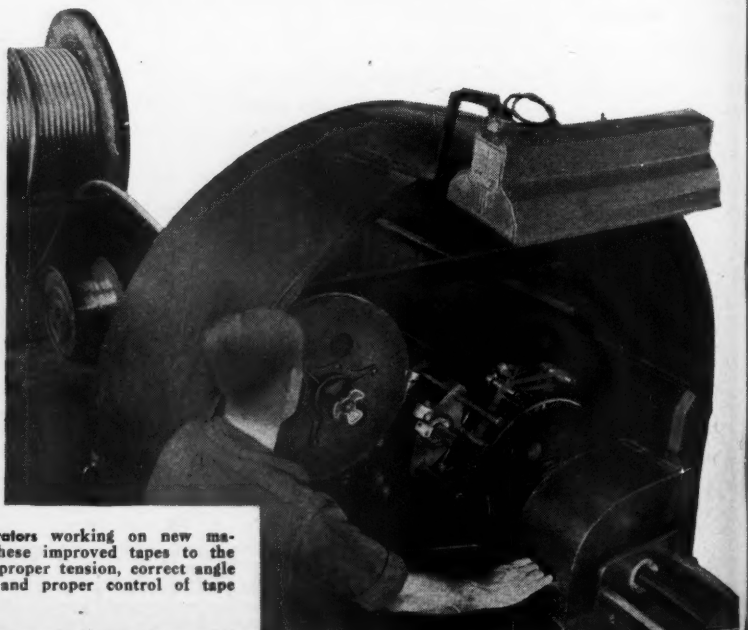


Dielectric strength tests are run on samples from each lot under carefully controlled conditions.



Hot oil and other solvents have little effect on varnished cambric.

Tearing strength, gauge and thread count are determined to maintain high standards of quality.

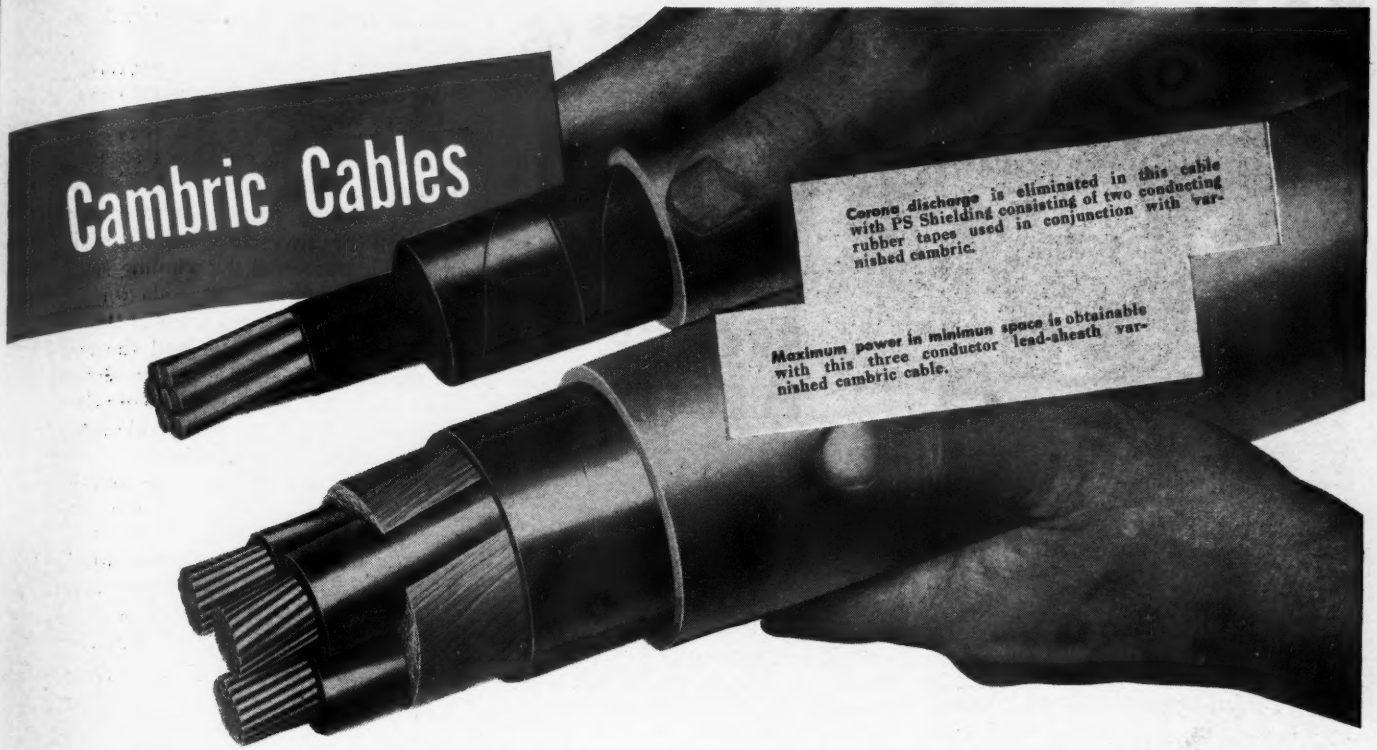


Experienced operators working on new machines apply these improved tapes to the cable assuring proper tension, correct angle of application and proper control of tape position.

Types of Varnished Cambric Cables

- Single-conductor series street lighting cables.
- Multiple-conductor non-leaded and unarmored cables.
- Control cables with combination of different colored braids.
- Single-conductor lead-sheathed cables.
- Single-conductor non-leaded cables.
- Multiple-conductor lead-sheathed or metallic-armored cables.

Cambric Cables


Corona discharge is eliminated in this cable with PS Shielding consisting of two conducting rubber tapes used in conjunction with varnished cambric.
Maximum power in minimun space is obtainable with this three conductor lead-sheath varnished cambric cable.

ENGINEERS who are faced with increasing the capacity of their power lines but are limited by conduit size will get help from the improved U·S·S Varnished Cambric Cables.

Higher operating temperatures can be used as the improved varnished cambric will stand temperatures up to 85°C. In this respect it is notably superior to rubber. It is also superior in dielectric strength so that thinner walls of varnished cambric insulation can be used for a given voltage.

These two advantages often make it possible to obtain the increased power capacity without ripping out the old conduits which is a costly undertaking.

Varnished Cambric Cable may be obtained with over-all braids, lead sheath, or Ampyrol synthetic resin non-metallic jackets. Type PS Shielding employing non-metallic conducting tapes over the conductors and over the insulation offers improved high-voltage operation.

Another important advantage is that they are not injured by oil, grease, or corona so they can be used around all types of machinery without danger of disintegration.

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Where to use U·S·S American Varnished Cambric Cables

IN MODERATE OR LOW-VOLTAGE INSTALLATIONS where its superior heat resistance permits greater current carrying capacity for a given copper area.

IN POWER PLANTS for general wiring and such applications as insulated bus bars, motor and generator leads, connections for oil switches, transformers and voltage regulators.

IN INDUSTRIAL PLANTS, especially where heavy loads must be transmitted for short distances.

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THE OLD WAY

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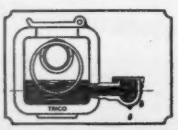

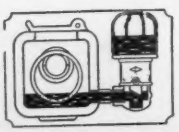

THE NEW WAY

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MILWAUKEE 12, WISCONSIN

may, therefore, be determined as follows:

210 volt tap — $210 \times 1.12 = 235$ turns
200 volt tap — $200 \times 1.12 = 224$ turns
185 volt tap — $185 \times 1.12 = 207$ turns
165 volt tap — $165 \times 1.12 = 185$ turns
150 volt tap — $150 \times 1.12 = 168$ turns

6) Determination of Core Length—

The winding may be arranged in one coil or two coils connected in series. Inasmuch as the winding space of the core window depends on the type of winding, the thickness of the insulation between layers, and the size of magnet wire, the window should have adequate area to accommodate the finished winding and provide satisfactory space for ventilation.

Either a core or shell type may be used. The cross-section of the core type is usually square. In the shell type, the width of the two outer cores is usually half that of the central core. The area of the latter is determined as described under item 2.—R.G.C.

A. TO QUESTION 227—If the core of a 50 or 100 v.a. potential transformer is available it will simplify the job of constructing an autotransformer to your requirements.

Assuming you have the core to start with, it is only necessary to design the coil.

The proper size wire may be found by the following equation and a magnet wire table.

$A = \frac{I}{d}$, where A = Area of the conductor in square inches. I = amperes in the winding at full load. d = current density in the conductor. A current density of 800 or 1200 amperes per square inch area of the conductor may be used, depending upon the coil thickness. 1000 amperes per square inch can be selected and the copper loss will be negligible.

The conductor size should be changed inversely as the voltage.

The applied voltage divided by the total number of turns determines the volts per turn. The desired voltage divided by the volts per turn determines the number of turns between taps.

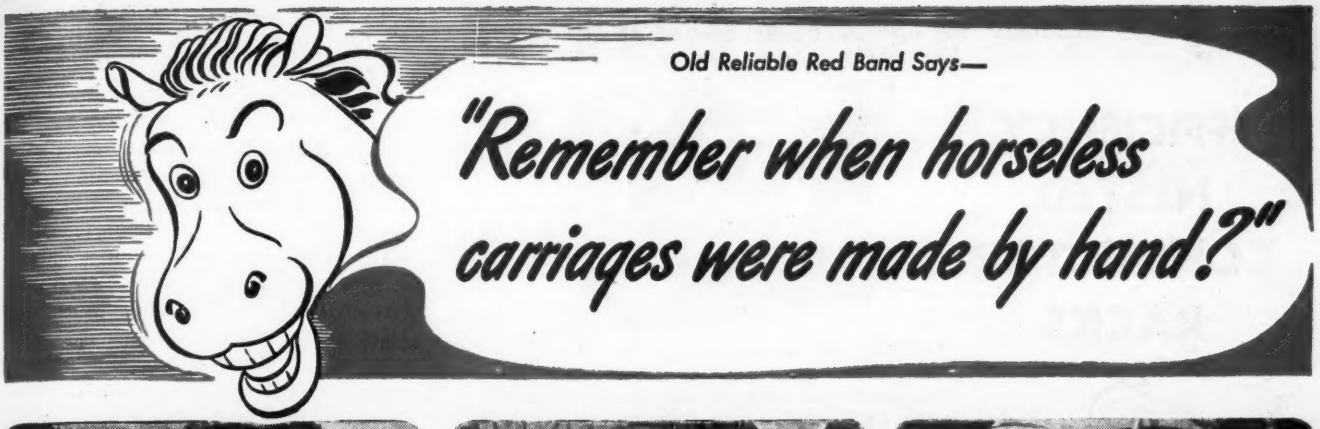
To find the necessary flux turns, the following quation is used—

$N\phi = \frac{E\ 10^8}{4.44/f}$, where N = total number of turns

ϕ = Maximum flux lines.
E = applied voltage.
f = frequency.

The numerals are constants derived in the development of the question. It should be noted a choice must be made betwen N and ϕ and substitute a value for it.

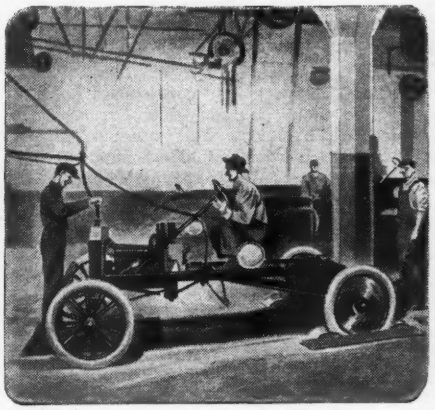
Assuming an old core is used, the space to be occupied by the coil and its insulation should be measured. The proper size wire found by means of the first equation. Find how many turns of



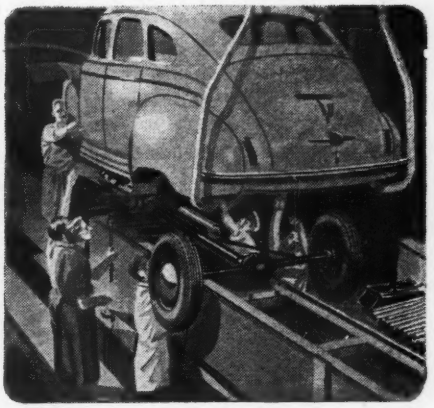
Old Reliable Red Band Says—

"Remember when horseless carriages were made by hand?"

1 **In 1897,** automobiles were put together with screw drivers and wrenches. Machine tools for the growing industry soon appeared. But parts made on these machines still had to be assembled by hand —it took a lot of "tinkering" to make them fit.



2 **In 1913** came the first moving assembly line—the forerunner of modern mass production. It eliminated the back-breaking labor of carrying parts from machine to machine, then to assembly point. Now, the work, not the man, progressed from operation to operation.



3 **Today,** electrical horsepower not only runs all assembly lines and conveyor systems, but also operates machine tools. Since 1915, Howell has specialized in making industrial type motors for these tasks in the automotive and many other industries.

Have you a hard job for Horsepower?

For *tough* jobs, an industrial type motor is just the ticket! For 30 years, we've been building Howell industrial motors to operate under the grueling conditions found in the automotive, machine tool, food, dairy and other important industries.

Howell Motors are first choice in a score of industries because: (1) They are precision-built of the finest materials, with copper or bronze rotors, and completely insulated. (2) They are smooth-operating – statically and dynamically balanced. (3) They are designed for the toughest tasks in industry – consequently they perform better on *all* jobs.

See the nearest Howell Representative for your needs in specialized or standard motors up to 150 h.p. Remember, you pay no more for industrial type Howell Motors—and always get top quality for your money.

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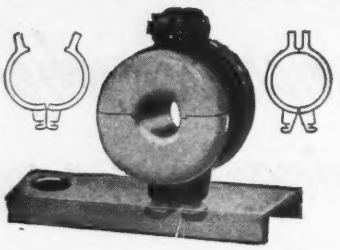
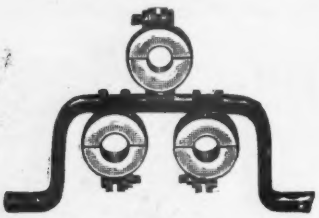
EFFICIENCY NESTED CONDUCTOR RACKS





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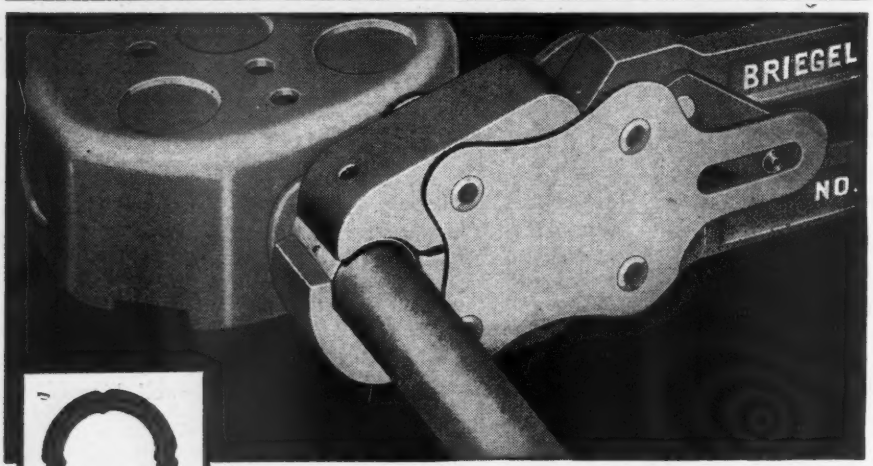

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wire of the size selected will entirely fill the window of the core, allowing room for insulation. The number of turns thus found is substituted for "N" in the second equation. The result will be the maximum flux in magnetic lines.

The next step is to find the area in square inches of the part of the core which is enclosed by the coil. Modern electrical sheet steel from which transformer stampings are made has a saturation curve which indicates the most efficient flux density to be near 90,000 lines per square inch. If that value is used, the necessary cross sectional area of the core can be found by dividing the maximum flux by the flux density.

Transformer laminations are coated with scale due to oxidation or more often a varnish coating is applied. Its purpose is to introduce a high resistance path between laminations and reduce eddy current loss.

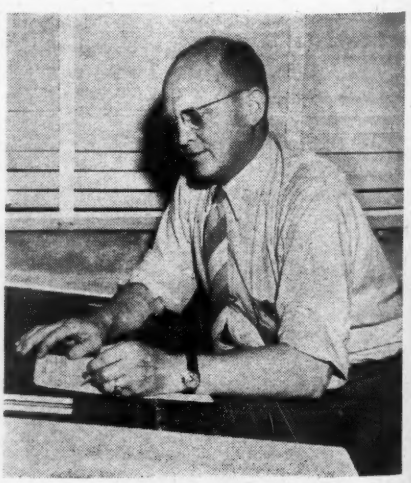
The space occupied by the scale or varnish must be reckoned with when stacking the laminations, the stack will be 10 to 15 percent thicker than figured. The form on which the coil is wound must be large enough to allow for it.

When the winding is complete, it should be securely tied, then removed from the form and impregnated with insulating varnish and baked.

Cambric tape or empire cloth may be applied and a layer of cotton tape. Another dip in varnish will finish the coil.

The part of the coil which comes in contact with the core should be protected against mechanical injury with 0.020 fish paper or fiber.

The steel stampings should be carefully assembled so the air gaps will be kept at a minimum, the coil wedged and the laminations clamped to eliminare vibration.—R.J.M.



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QUESTION 228—How can we soften wire on small armatures to take data? If we apply heat on varnishes, it gets harder—H.R.

ANSWER 228—In our shop we overcome this by inserting the armature in a round low resistance coil insulated with mica made up especially for this purpose. We have several different size coils for different size armatures. In some cases if the right size coil was not available, we would place a layer of mica on the armature and wrap this with wire of about 2.2 ohms resistance, 110 volts for a 3 in. armature (using No. 18 or 20 wire). By interrupting the current with a hand operated switch, this would create induced heat in the armature coils and they can be lifted out easily to take data.—R.D.R.

ANSWER 228—I would suggest that you try to use a blow torch on some of these tough ones (taking special care that you do not overheat and melt the copper); and at times you may have to hold the flame right on the armature while working on it as some compounds will harden rather soon after removal of flame. All that is necessary is to be able to loosen wires of the last coil, usually the easiest one to get the data from.

Also, if you can find out the thinner used for these varnishes, they will loosen or soften your wire but I believe this method would be expensive.—E.K.

ANSWER 228—Remove, or otherwise protect the commutator and soak the armature in a boiling solution of caustic soda until the varnish and compound softens. The solution will destroy the fiber end rings but they can easily be replaced.

The armature should be stripped while hot and thoroughly dried before being rewound.—T.B.B.

"Bill" Damon, (left) genial secretary-manager of the Oklahoma State Chapter, NECA, Oklahoma City, discusses association business with Harry Reeves of the Industrial Electric Company. "Bill" legs it around the state so much he rarely has the chance to doff that topcoat.

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The double-bridge assembly at left is another cool construction feature, helping to lower contact resistance and excessive heating.

Write for Brochure giving details of all the COOL FACTS, sizes and prices.

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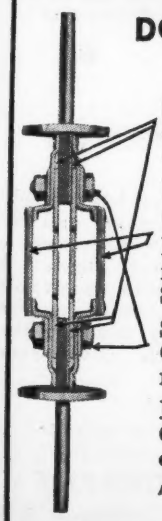

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Male plugs can be used with interlocking safety switch and QuelArc receptacles, rating 60 amp., 2-wire 3-pole, and 3-wire 4-pole types. Female plugs also available 3-wire 3-pole, and 4-wire 4-pole types.

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Can you ANSWER these QUESTIONS?

QUESTION H10—We have two transformer banks that supply energy to our plant. One bank consists of three 500 kva. 7200/480 volt, 1 phase transformers connected delta-delta for three phase operation, and the second bank is composed of three 200 kva. 7200/240 volt transformers connected likewise. A set of neon ground detector lamps are connected to the 480 volt system and at times they glow intensely and voltage to ground is tested at 800 volts approximately when this condition occurs. All transformers and circuits have been thoroughly tested; however, this condition happens quite frequently. What could be the cause of this trouble?—G.A.D.

QUESTION J10—Two lights are connected in parallel and controlled from three points, using one four-way and two three-way switches. These had been working ok. for years but all at once these lights could be turned on from any point, but could not be shut off from the other two points. We tried this at all three switches with the same result; that is, throwing one of the switches which did not put it on, only resulted in a 'flicker' of the lights. What is wrong?—R.M.

QUESTION K10—We are having considerable trouble with our cellophane paper curling due to static current. I would like to know if it would be possible to build a static eliminator and how?—R.E.P.

QUESTION L10—Is there any way in which I can simply adjust thermostats (Bimettalic type) that are used to protect fractional hp. motors and are mounted on the motors. The ones that I have seen use an adjusting screw which can be set to protect the motors at definite temperatures and I would like to know how I can set it for a particular temperature?—E.J.K.

QUESTION M10—A 100 kva. capacitor bank, installed for power factor correction on a 3 phase, 60 cycle, 480 v. system, heats excessively. How can we determine if this is caused by harmonics and if so, what is the remedy?—J.J.L.

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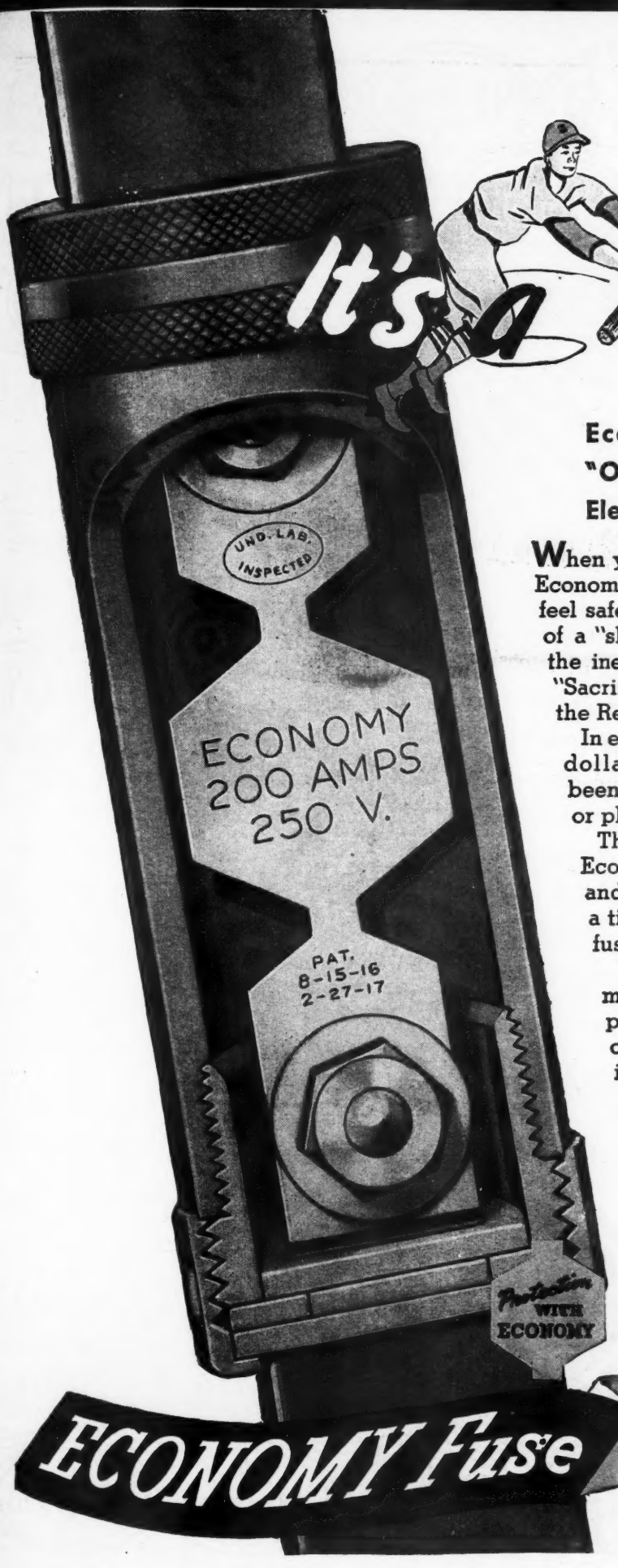

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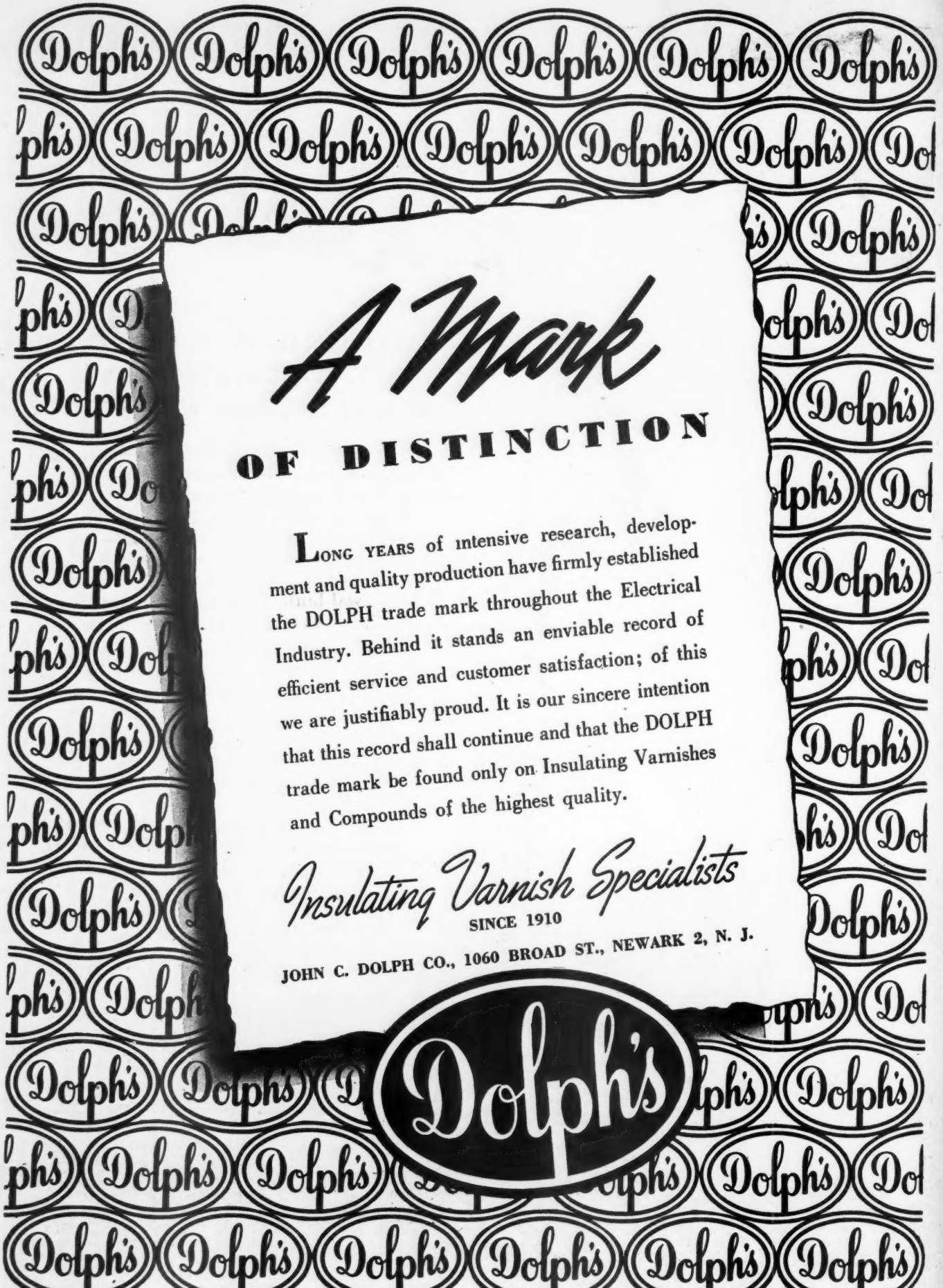
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Motor Shops

Magnify Coil Turns

Shop mechanics winding current transformer coils with small wire generally experience fairly severe eyestrain, particularly while watching the threadlike wire as the coil builds up. Not only the man, but his work eventually suffers as a result of this condition.

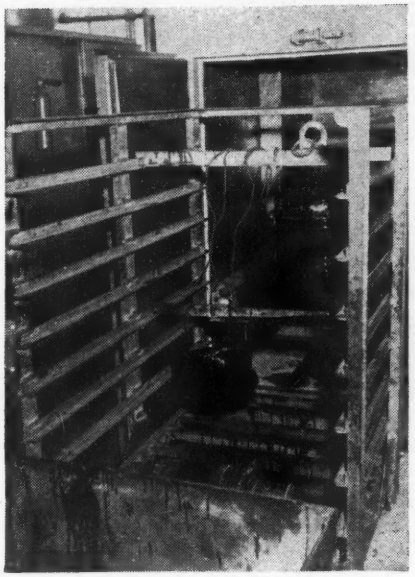
Spaulding Electric Company, prominent Detroit electric motor service shop, has found a way to eliminate this possibility by the simple expedient of equipping their winding machines with an illuminated magnifying glass. The unit, a Boyer-Campbell super-sight magnifier, comprises a 6-in. diameter magnifying lens in a square plastic frame which accommodates, on its underside, two 25-watt, 115-volt, bayonet-base, tubular incandescent lamps. A universal bracket arm permits positioning the lens at any desired angle or distance from the work. The operator views the coil through the lens.

Spaulding uses the lens in all work requiring wire sizes No. 28 and smaller. It proved to be particularly helpful on a recent current transformer rewind that required some two hundred thousand turns of No. 32 wire.

Adjustable Bake Rack Increases Capacity

A rolling baking rack, dimensioned slightly less than the limits of the oven to permit ready removal while utilizing maximum capacity of the oven, is one of the shop-created motor repairing aids employed by the New England Machine and Electric Company of Pawtucket, R. I. The rugged rack of welded construction rolls on heavy-duty industrial castors through biparting, insulated oven doors.

Running horizontally along either side of the rack, and spaced vertically at 8-inch intervals, are series of 1-inch angle-irons. Other angle-irons, slotted at either end and with an off-center steel eye to facilitate crane handling, can be placed across the horizontal side angles at any desired elevation and at any point along the side arms. Stators



Shop-fabricated baking rack of angle-iron welded construction utilizes maximum capacity of oven due to adjustability of notched cross-bars. Off-center steel eyes on cross-bars provide for crane handling. Stators are suspended with windings in vertical position by means of threaded and hooked steel suspension rods that screw into motor cap bolt holes and attach stators to cross-bars.

are suspended from these slotted cross-bars by means of hooked and threaded suspension bolts that are inserted into the motor cap bolt holes and hooked over the cross-bars.

Since the cross-bars can be staggered arbitrarily from tier to tier and the suspended stators staggered along the length of the cross-bars, the arrangement of units on the rack is extremely flexible and the available space can be utilized to its maximum capacity. By staggering the stators in the rack, the dripping varnish from one unit has little chance of accumulating on a unit on a lower tier. By suspending the stators with the windings in a vertical position, any tendency of accumulation that the varnish may have tends to stiffen and strengthen the windings at their most vulnerable points. Depending on the size of motor and windings, the dipping-baking cycle is varied from two to four repetitions. To keep varnish accumulations evenly distributed along both edges of the windings, the threaded steel supporting rods are placed first in one set of cap holes and then in the opposite end.

Motorized Insulation Crimper and Creaser

Transformers, particularly the REA distribution type, comprise a good portion of the electric equipment repair work done in the W. W. Tarrant Electric Machinery Company shop at Wichita, Kansas. Since insulating paper must be placed between each layer of the transformer windings, a quick and efficient method of crimping and creasing the insulation had to be found. Always interested in devices that increase the quality and quantity of production in his shop, W. W. Tarrant designed a motorized unit that will crimp the paper in one operation and crease it in another.

Both operations are done by the same set of two steel rollers, positioned one above the other and rotating (through a spur-gear arrangement) in opposite directions (see Fig. 1). Each roller is one inch in diameter and three inches long. The top one has a 1/32 inch bead around its circumference; the lower one has a corresponding groove in which the bead rides. Insulating paper passed through the rollers at this point is crimped by the bead and groove. Once crimped, the insulating paper is passed through a folding blade

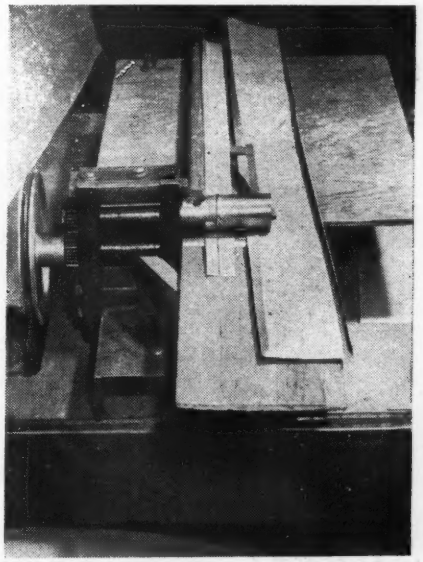
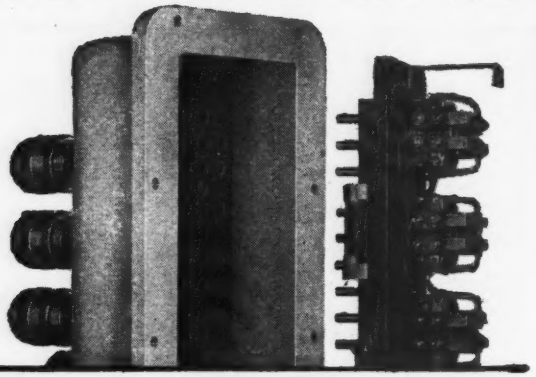


FIG. 1—Simple motorized device that crimps and creases insulation paper for transformer coils. Photo illustrates twin operation of crimping (narrow strip at left) and folding and creasing (wide strip at right).

for...
Complete Protection



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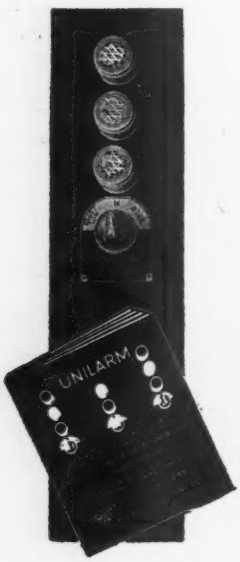

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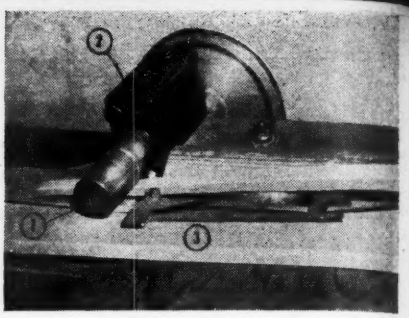

FIG. 2—Salient features of the crimping machine are the gear-driven top roller (1) with its flat surface for creasing and bead for crimping; V-belt driven bottom roller (hidden) with groove; coil-spring pressure device (2) for top roller; and folding blade (3) for creasing. Paper slides along adjustable plywood "rest" board.

(see Fig. 2) and under the flat surfaces of the same rollers. It emerges on the other side creased and ready for use.

The roller shafts rotate in an inverted U-shaped steel support. Pressure on the top roller is maintained by a coil spring with a single bearing ball at each end. This assembly rests in a vertical hole bored through the support nearest the roller. A spring steel leaf, bolted to the top of the shaft support and extending over the coil spring, provides the pressure.

The roller assembly, bolted to a 4-inch channel iron base (26 inches long), is fastened to a table top. Mounted behind and level with the top of the lower roller is a 12-in. by 16-in. plywood "rest" with a guide bar. Adjustment for "flange" width for various "cuts" of insulation paper is provided by a thumb-screw and slot clamp arrangement. The entire "rest" board can be moved back and forth parallel to the axis of the rollers. An 11-inch extension to the "rest" board is mounted in front of the rollers to catch the paper after it has been crimped and creased.

The unit is driven by a ¼-horsepower, single-phase, 60-cycle, 1725 rpm. motor (mounted at the base of the table) through a V-belt (5 to 1 ratio) arrangement.

Brazing Stator and Armature Connections

By O. A. Clot

Peninsular Armature Works
Miami, Florida

The development of low temperature welding and brazing alloys has, to a great extent, made obsolete most of our old methods of securing armature and stator connections. In spite of the

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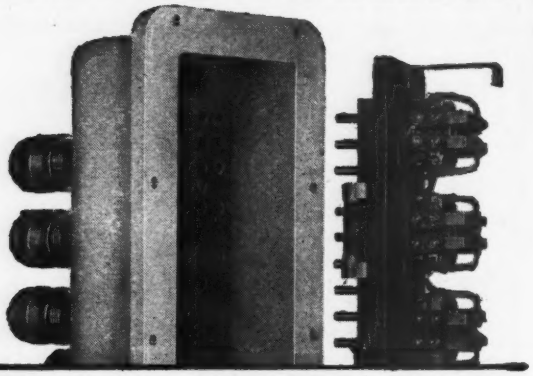

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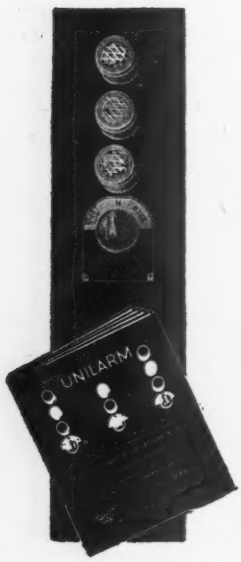

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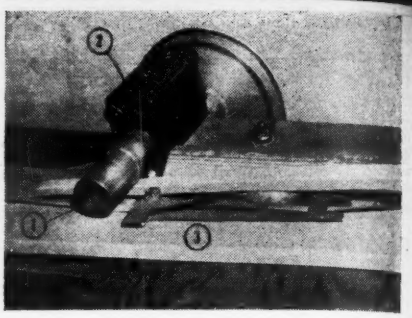

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various machines used for removing magnet wire insulation, the system of scraping and soldering with ordinary solder, is in most cases too slow. In our shop we have found that considerable time is saved in connecting stators wound with No. 20 wire and larger by the use of low temperature brazing.

We eliminate the scraping time altogether, by merely making up our splices without removing the insulation whether it be cotton, enamel or formvar. Next we heat the splice with an oxygen acetylene flame and apply the brazing rod to the splice. The flame should be slightly excess in acetylene so as not to burn the copper. The rod used in our shop is a product known as Phoscoat and is sold by the National Welding Supply Company, Charlotte, North Carolina. This alloy melts at approximately 1180 degrees Fahrenheit, remelts at the same temperature and is self fluxing, flows readily and has about five times the mechanical strength of ordinary solder.

It is especially useful on glass wound jobs for high temperature operation due to its high remelting point. When used on wire having glass insulation, the glass must be scraped off. We find that an operator can be trained to use this method in about 15 minutes, assuming that he has some mechanical ability.

We also find this alloy very practical for resoldering squirrel cage rotors that were orginally soldered with ordinary solder and have run hot. Just heat the rotor and ring and bars with torch to the proper temperature and apply the rod. The rotor does not have to be buffed or even degreased, although sometimes dipping the rod in borax will make a smoother job.

Cast aluminum rotors sometimes prove a source of trouble, especially when a motor has been hot enough for the aluminum to melt. Our method of rebuilding cast aluminum rotors is as follows:

Remove the aluminum from the rotor by dissolving it in caustic potash—this system is a little slow but it is safe. The action can be accelerated to some extent by connecting the negative terminal of a source of direct current supply (about 30 amperes at 24 volts) to the side of the steel caustic tank and the positive terminal to the rotor itself which is submerged in the caustic solution.

Leave the current on till the caustic boils, then shut off and apply the current again when caustic has cooled. The time required to dissolve a five hp. 1800 rpm. motor is about 24 hours. When the rotor has been thoroughly cleaned, annealed copper bars are inserted through the slots and bent over at right angles and against the core. Then the end ring is built up

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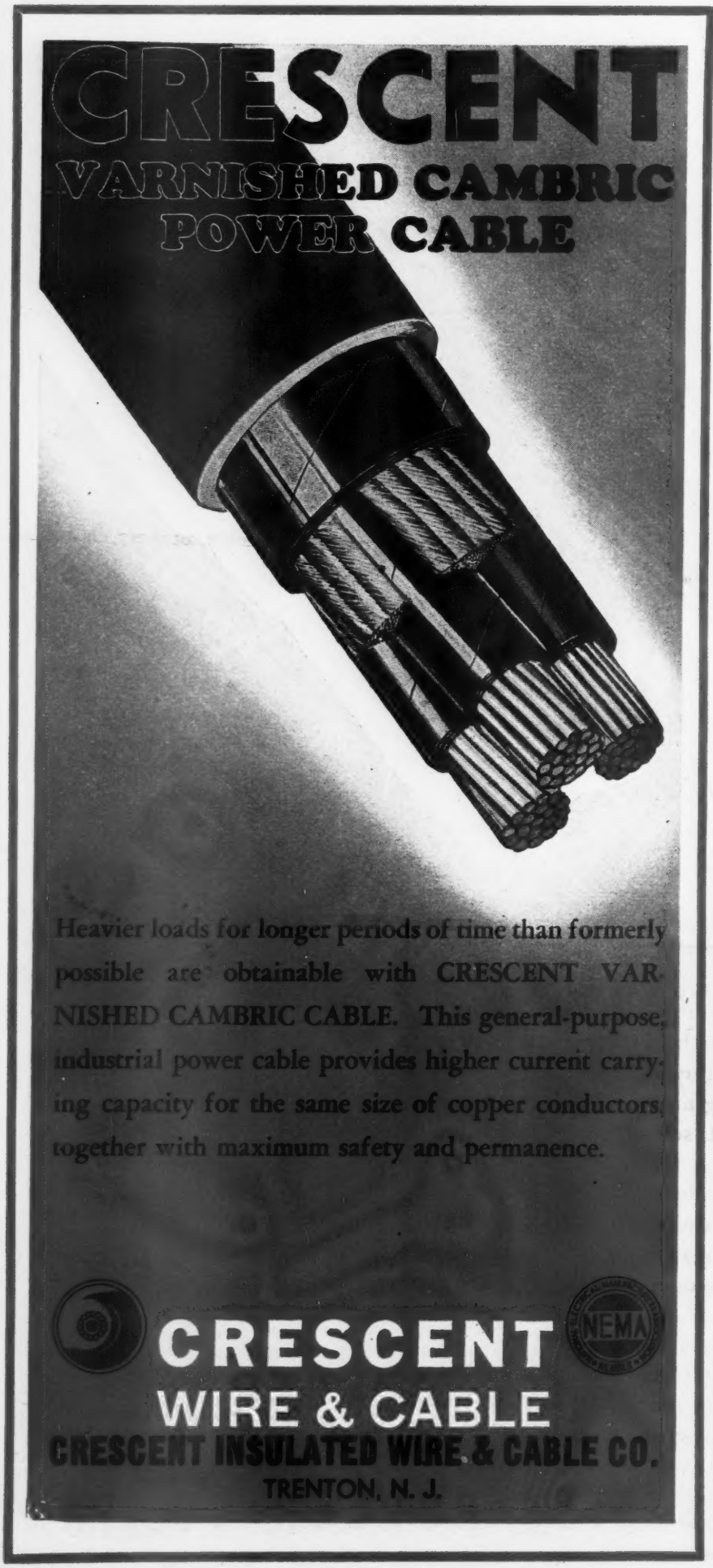
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with Phoscoat and the welding torch. A ring built of Phoscoat should have the same gross section as the original aluminum ring, as their conductivity is about equal.

We found, over a period of two years, that the use of these methods have saved us considerable time and have turned out a better job.

From a paper presented at the NISA Convention, Tampa, Fla.

Hot Lye Bath Aids Coil Salvage

The scarcity of large size, rectangular, copper armature bars has induced many motor shops into reconditioning and reusing the original coils when rewinding the armatures. Old insulation is removed and the copper bars are scraped, straightened, annealed, tinned and reformed to conform with a coil pattern. The standard procedures of insulating, taping, dipping, baking and inspecting complete the reconversion cycle. One of several methods in use for removing old insulation is immersion of the coils in a hot lye bath.

Stearns, Perry and Smith, motor repair organization of Boston, Mass., erected a small bath of this type in a

Vented hood covers enclosure around lye bath, protecting shop workers, removing vapors and confining heat. Access to the tank is through wide, bi-parting hinged metal doors.

corner of their shop. To confine the heat, protect workers against accidental lye burns, and to remove vapors and odors, the tank is confined by a circular enclosure which is hooded with a conical vent and exhaust flue. The front half of the enclosure comprises two hinged doors which are closed after the coils are placed in the tank. The bath and hood may be made from any sheet metal available for the purpose and the heater may be gas, oil or charcoal fired.

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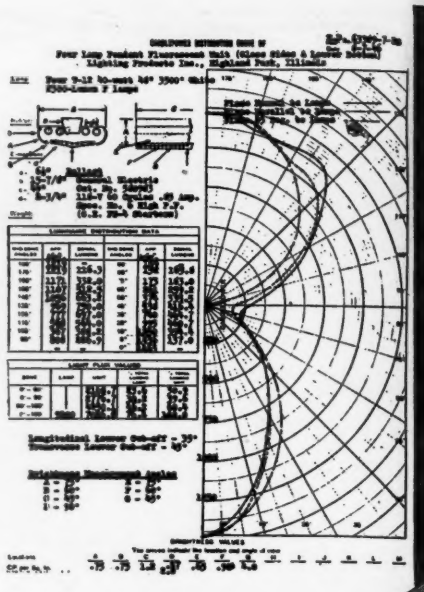
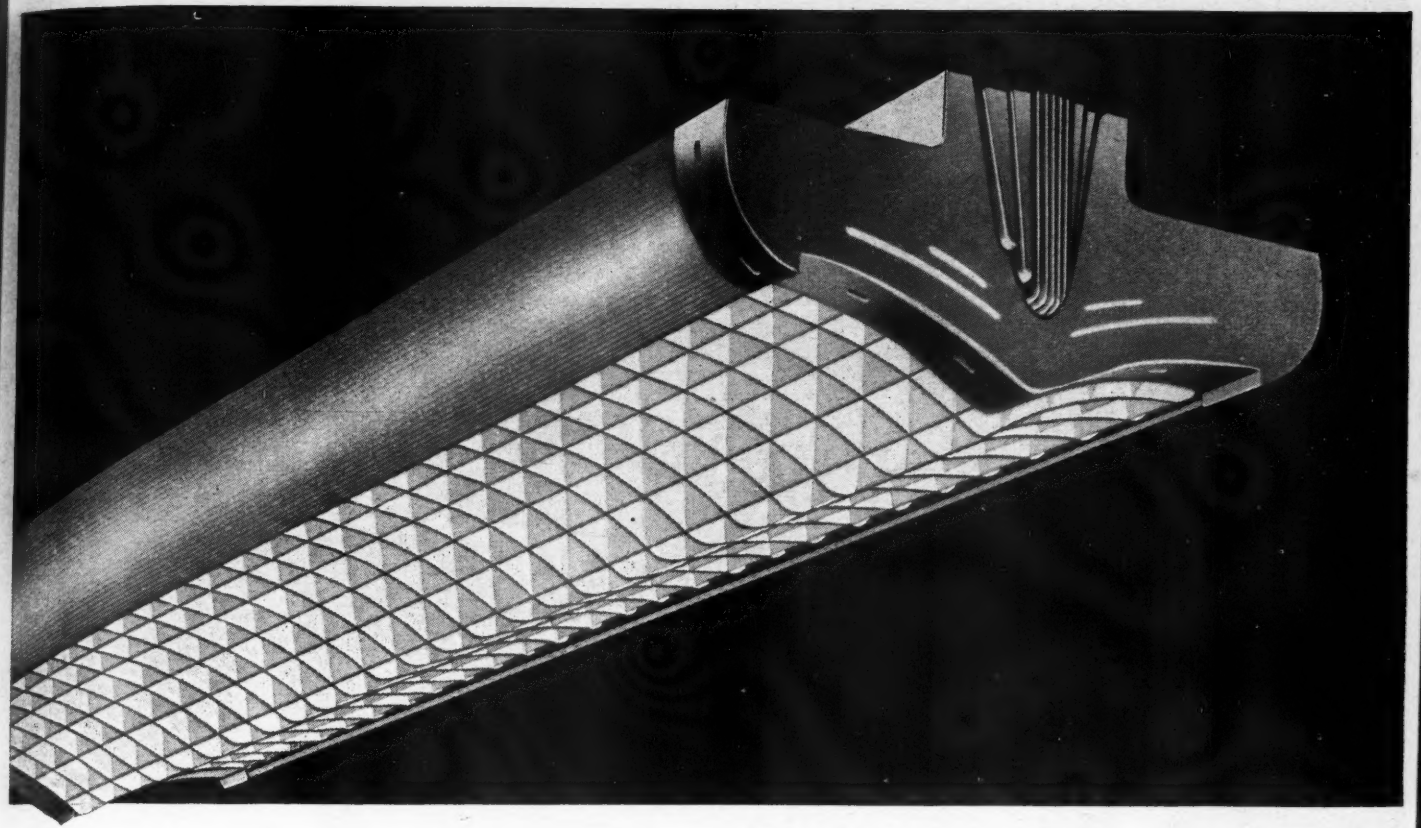
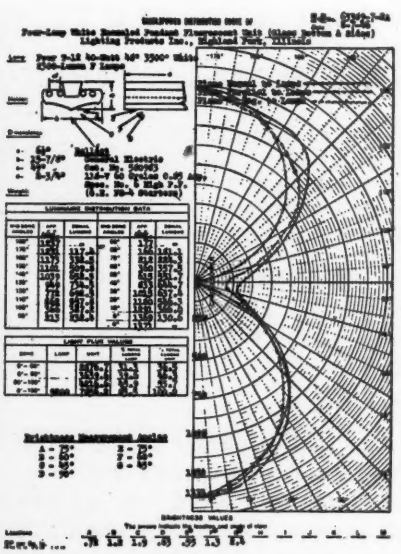


The above chart for the glass and louvered fixture was compiled by the Utilities Research Laboratories.

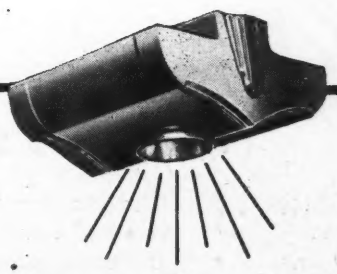
Constellation*





All glass No. 110 Series approved by the Utilities Research Commission.

Above charts compiled by the Utilities Research Laboratories.



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F. N. M. SQUIRES and GLENN ROWELL
New York Board of Fire Underwriters
Chief Inspector
New York, N. Y.
Electrical Engineer
Fire Underwriters Inspection Bureau
Minneapolis, Minn.

Questions on the Code

2300 Volt Service Installation

Q. *We plan to install a 2300 volt service and would like to use open bus between the service panel, transformers and distribution panel. This will all be housed in a small fireproof building adjacent to a linseed oil expeller plant, and the transformers will be separated from the control panels by a tile partition. The question has been raised as to whether or not the Code would permit the use of open bus within the roof housing the control panels, so we will appreciate your suggestions regarding this job.*—L.D.

A. If the building housing both the transformers and the control panels is accessible only to properly qualified persons, Section 2387a will permit the use of open bus. If the room containing the control panels also contains control equipment for individual circuits or feeders making it necessary to have the control room accessible to other than qualified persons, the open bus might still be used if it is guarded.—G.R.

Service Equipment

Q. *The sketch represents a meter and three main switches installed as service equipment in a single family dwelling.*

Each switch disconnects two branch circuits. Does the above comply with Article 230—Section 2351A?—H.L.G.

A. Section 2351a states that the disconnecting means of a service may not consist of more than six switches in a group of separate enclosures located at a readily accessible point nearest to the entrance of the conductors and section 2371a states that the overcurrent protection may consist of not more than six sets of fuses. Further, Interim Amendment No. 65 revised Section 2357 to permit a service switch to have a rating not less than the load to be carried as computed in accordance with Section 2203 (for feeders).

The layout as shown in sketch meets all of the stated Code requirements and therefore would be approved under the National Code.—F.N.M.S.

Wiring for Grain Elevators

Q. *We have wired several country grain elevators and are grouping all motor control equipment within the office or a special room constructed on the work floor level which can be kept free of grain dust. On our last job we were advised that the control for the motors in the cupola could not be placed on the work floor as such an installation would be a Code violation. Compliance with such a request would make it necessary to use the more expensive dust-tight equipment or construct a second dust free room in the cupola. What is the Code regulation on this?*—A.D.

A. It is general practice to use ordinary electrical equipment within a dust free room for the control of both light and power circuits in hazardous dusty locations. Section 5056 of the Code carries the following fine print note: "It is recommended that motor control devices be of the remote control type with main contactors located in separate rooms or compartments built of or lined with substantial noncombustible materials, so constructed as to exclude dust, flyings or lint. The remote control push buttons or switches may then be placed in the most convenient locations". Section 4386 states: "A motor and its driven machinery shall be within sight of the point from which the motor is controlled unless one of the following conditions is complied with:

(a) The controller or its disconnecting means is capable of being locked in the open position.

(b) A manually operable switch, which will prevent the starting of the motor, is placed within sight of the motor location. This switch may be placed in the remote control circuit of a remote control type of switch.

(c) Special permission is given by the authority enforcing this code.

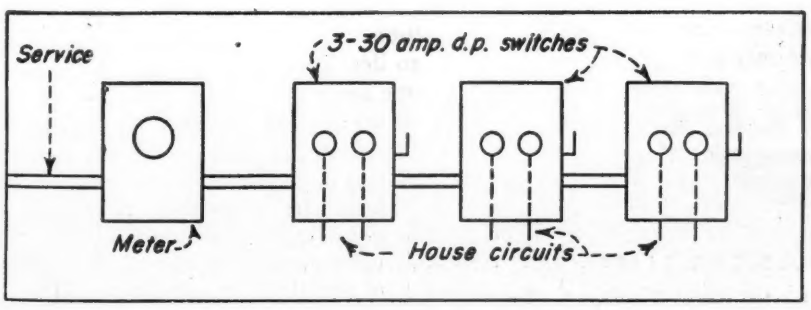
(d) As otherwise specified in Article 500 of this code".—G.R.

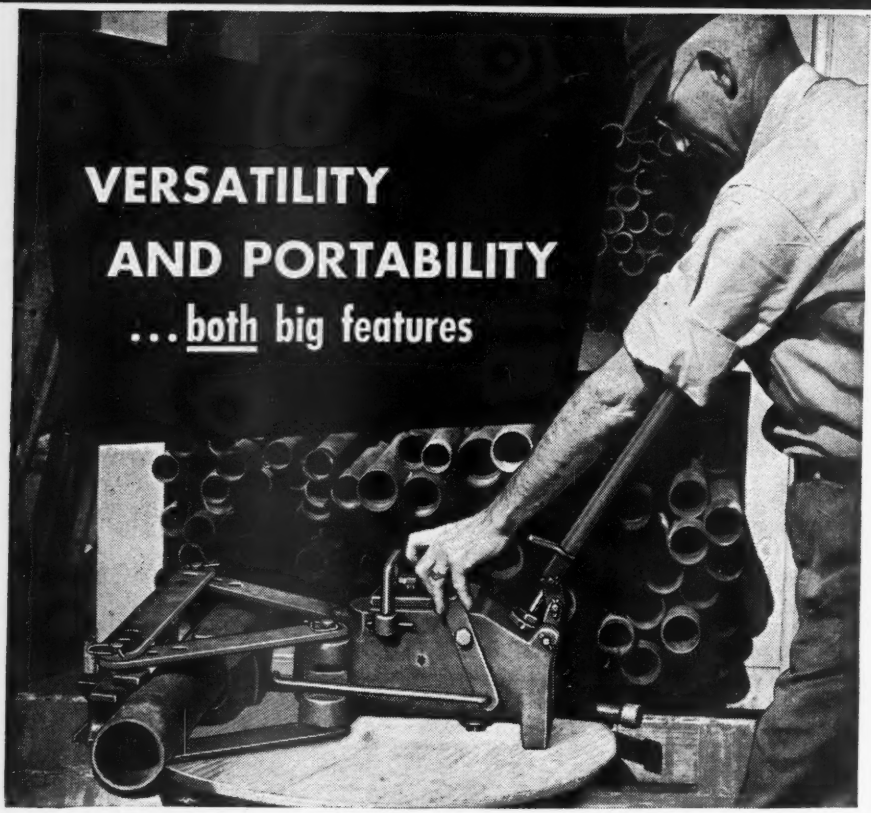
Over-Current Protection

Q. *Will you please let me know if the Code allows over-current protection for wires or motors other than fuses and circuit breakers?*—F.A.B.

A. The Code recognizes only fuses and circuit breakers as over-current protective devices for the protection of conductors. (See Sections 2404 and 2405).

For the protection of motors, however, the Code does permit other devices such as thermal cutouts, thermal relays, inherent overheat devices and,





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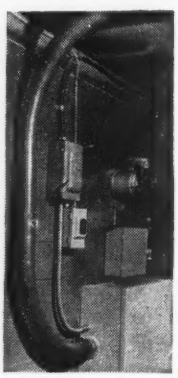

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under certain conditions, safety controls for which see Sections 4322c-3.

Where these thermal devices are not designed to open short circuits, they must be backed up by fuses or circuit breakers.—F.N.M.S.

Emergency Lighting

Q. *Is it necessary to install wiring for exit lighting in separate raceways to the exclusion of all other lighting conductors?*—E.S.

A. This depends upon the type of emergency lighting system selected.

If two or more separate and complete systems each providing emergency lighting (including exit lights) with independent current supply, of which one or both are a part of the general house lighting system, the wiring would not have to be kept separate. If however, the above system was not followed, then an emergency lighting independent of the general lighting system and entirely independent of all other wiring and equipment, would have to be installed.—F.N.M.S.

Portable Power Tools

Q. *We have noticed numerous instances where employees of contractors constructing frame dwellings are using portable power tools and are wondering if the Code permits the use of such ungrounded appliances? In some instances power is furnished by gasoline driven generators, but usually it is obtained by an extension cord connected to the wiring of a nearby building.*—L.M.

A. Your question is answered by Section 2545-C of the Code, which reads as follows:

"In other than residential occupancies, exposed metal parts of portable appliances used in damp or wet locations, or by persons standing on the ground or on metal floors or working inside of metal tanks or boilers, shall be grounded except where supplied through an insulating transformer with ungrounded secondary of not over 50 volts."

Inasmuch as workmen handling portable power tools during the construction of houses would no doubt spend at least part of the time standing on the ground, the Code would require that the exposed metal parts of the frame of such tools be grounded.—G.R.

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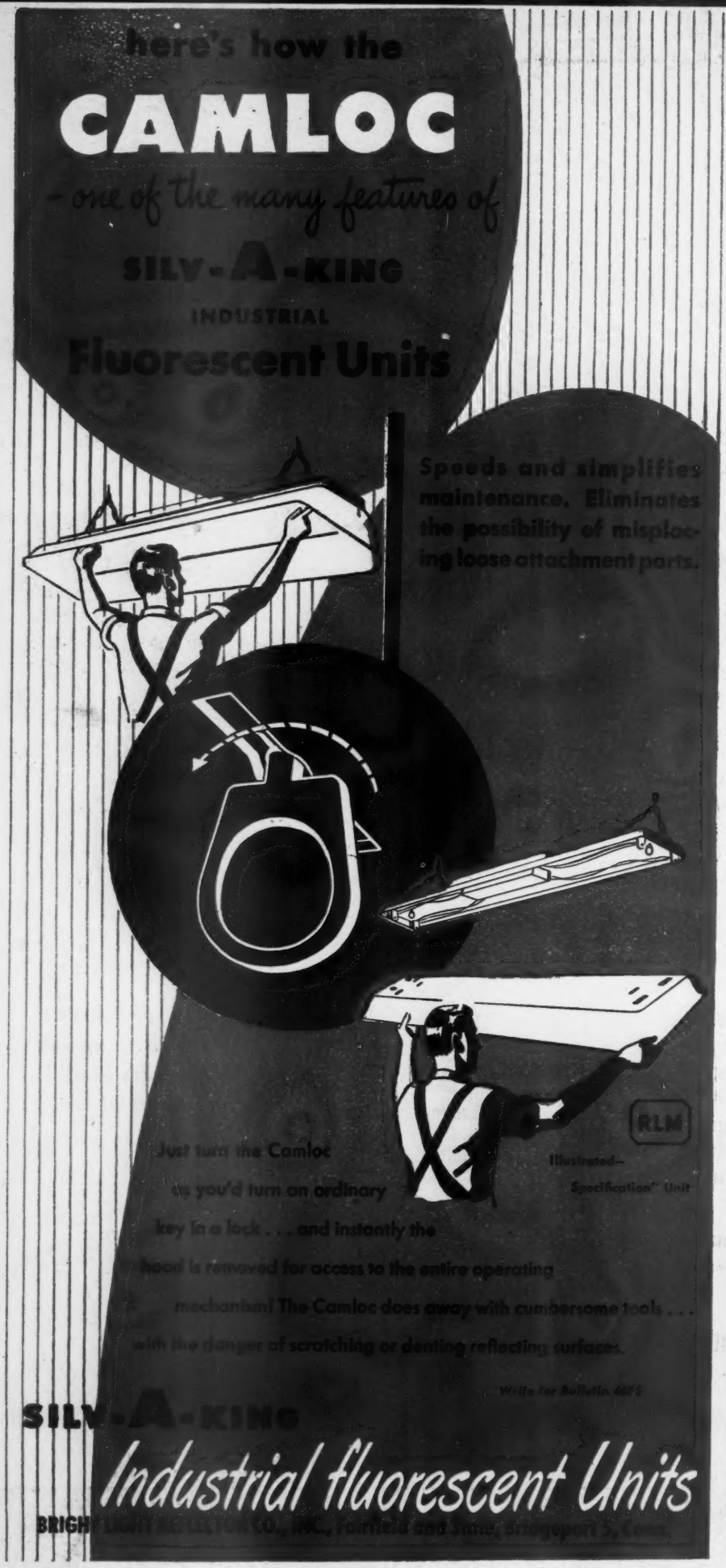
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BRIGHT

Rewiring Defense Houses

Q. *A number of semi-portable defense houses are being set up here, and I have the job of revamping the wiring. These houses were wired with Romex, and the thermal insulation used appears to be ground up paper. To comply with the local ordinance several additional outlets have to be installed, and the inspector says Romex cannot be used because the thermal insulation is neither approved nor noncombustible. Greenfield is impossible to buy and the outlets have to be fished, so I am wondering if loom over single conductors would be O.K.*—P.W.

A. In view of the fact that the 1946 edition of the Code will drop any reference to the type of thermal insulation used, I believe it might be possible for you to talk this over with your Electrical Inspector and possibly he will then permit the use of nonmetallic sheathed cable. Sections 3249 and 3370 appearing in the 1940 Code have been deleted entirely from the coming edition, so while the present Code definitely forbids the use of concealed knob and tube or nonmetallic sheathed cable wiring within the hollow spaces of frame walls which have been filled with a combustible insulation, the new Code will permit it.—G.R.

Radiant Floor Heating

Q. *We have a contract to wire a job in which the heating system is laid out for radiant heating having the steam coils embedded in the floor slabs.*

The engineers who laid out the job claim that the heating coils will vary between 110° and 90° F. and therefore the heat should have no effect on Type R wires.

The heating coils and the electrical conduits both are run in the same floor slabs, the transverse runs of conduits being above the heating coils.

We question the possibility of interference between the runs of Type R wire in conduit and the heating coils. —R.T.

A. Note No. 8 following Tables 1 and 2 of the Code, together with the temperature correction table under each table, furnish the requirements for the conditions such as outlined above.

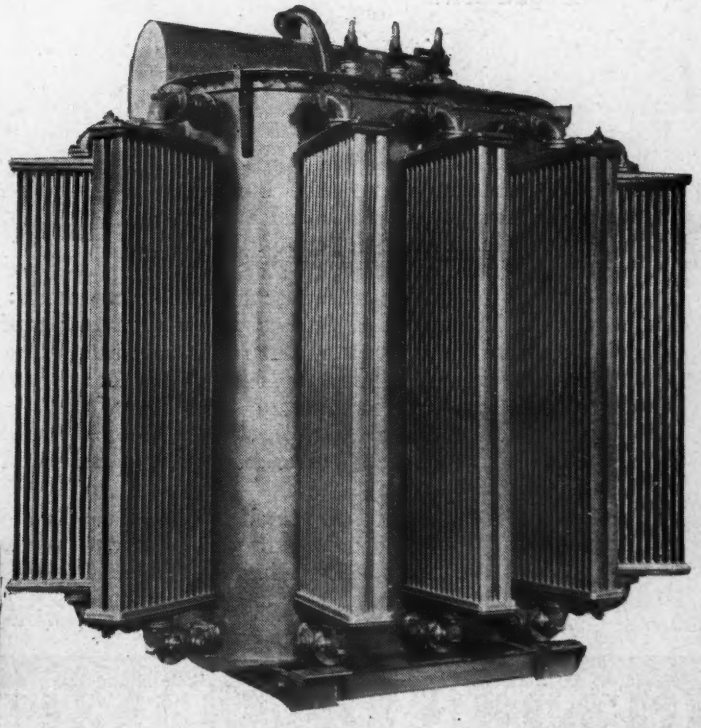
Efficient Energy Transformation in all its forms — AMERTRAN

Power
Distribution
Rectifiers
Dry Types
Voltage Regulators
Industrial Electronics

● There is an accelerated trend, begun many years ago among top-flight engineers, to "take it up" with AmerTran. We have many case histories on file which prove the benefits of this talking it over with our engineers. In recommending a transformer for a more or less routine circuit function, it is possible very often to furnish a type which affects an improvement in operation, or a saving in space-weight considerations. Where tapped and multiple windings are involved in intricate circuits, this possibility becomes a virtual certainty.

In the established fields of utility and industrial power and distribution, AmerTran Transformers continue to anticipate and incorporate the latest design innovations—and to give that reliability of performance which has earned the confidence of the entire electrical industry.

We'll be very glad to consult with you on any phase of transformer practice.



AMERICAN TRANSFORMER COMPANY
178 EMMET STREET • NEWARK 5, N. J.

AMERTRAN
REG. U. S. PAT. OFF.
MANUFACTURING SINCE 1901 AT NEWARK, N. J.

Pioneer Manufacturers of Transformers, Reactors and Rectifiers for Electronics and Power Transmission

AMERTRAN

KEEP 'EM PROUD

OF YOUR LIGHTING JOBS...

BY USING *WATCH DOG** STARTERS THROUGHOUT

When you first install a fluorescent lighting job, everybody's proud of it, and your reputation rises.

But are you sure they'll *stay* proud of it as time goes on? You will go a long way toward being sure, if every fixture is equipped initially with G-E Watch Dog starters.

Watch Dogs keep the job completely free from blinking and flickering lamps as the lamps reach the end of their service life. A built-in "cut-out" prevents the futile attempts to start dying lamps, protecting the ballast and the starter itself.

Fluorescent lighting installations which *start out* equipped with Watch Dogs *continue* to add to your reputation as a fluorescent lighting expert. Because the user finds his maintenance costs are low, because his relamping is so simple, he's a prospect for more fluorescent lighting. And on older installations, too, a complete change-over to Watch Dogs is your best move to more user satisfaction and more fluorescent profit.

For full information on G-E Watch Dogs for 20- to 100-watt lamps, see your G-E Merchandise Distributor, or write Section G18-108 Appliance and Merchandise Department, General Electric Company, Bridgeport 2, Connecticut.

*Trade-mark Reg. U. S. Pat. Off.

GENERAL ELECTRIC

As the floor slab temperatures reach 110° F. the allowable carrying capacity will be derated to 50 percent of the values shown in the Table. For instance No. 14 Type R wire will have a rating of only 7½ amperes instead of 15 amperes and No. 12 Type R will be good for only 10 amperes instead of 20, etc.

Type R H wire would carry only 82 percent of its normal rating under similar conditions.

Of course, if the wires are to be subject to higher heats the derating will be even greater, and it must be remembered that with ambient temperatures equal to, or higher than the maximum operating temperatures of insulations as shown in Section 93001, paragraph d, there will be no carrying capacity left.

When the 1946 Code comes into force on or after November 1, 1946, the present grade of Type R wire will not be recognized by the Code but the then Type R will be of the order of present Type R P wire.

The correction factor then for the conditions similar to those stated above, will be 71 percent for the new Type R.—F.N.M.S.

Lighting for Service Station

Q. *Where in the Code may I find the rulings making it mandatory to use explosion-proof lights in the side walls of a greasing pit in a gasoline service station?*—L.R.

A. This will be an easy question to answer once the 1946 edition of the National Electrical Code is effective as it will be found there under Section 5141 and is headed as "Gasoline Dispensing and Service Stations". However, in the 1940 edition we have to refer to Article 510 on garages and Article 100 for the definition. Under definitions we find that a commercial garage is one in which cars are serviced or sold. Therefore it is assumed that a filling station in which one or more cars may be serviced must be wired as directed by Article 510. Then under 5103C may be found the following: "All other equipment which tends to produce sparks or arcs, such as cutouts, switches, receptacles, fixed lampholders and charging panels, if within 4 feet of the floor shall be of a type approved for use in Class 1 locations as defined in Article 500." Therefore the Code requires the use of explosion-proof Class 1 Group D fixtures in the greasing pit if artificial illumination is desired.—G.R.

CROUSE-HINDS

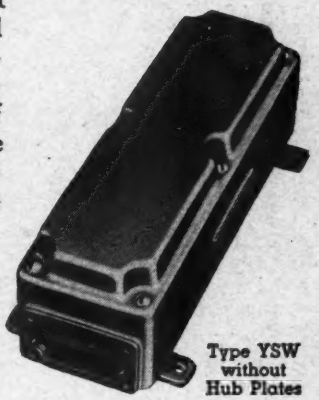
Detachable Hub Plates for CONDULETS

Many CONDULETS are designed to take demountable hub plates, thus extending their usefulness. When such CONDULETS are installed, it is easy to tap an electrical conduit system at any time and add branch circuits without interrupting service. Simply remove a blank plate and add a plate with the required number and size of hubs. In many cases demountable hub plates make the use of unions unnecessary. Crouse-Hinds hub plates can also be used as pipe flanges that have the advantage of an internal bushing. (See outline drawing below.)

The illustrations show a selection of detachable hub plates and a few of the CONDULETS that take such plates.

Type RSS without Hub Plates

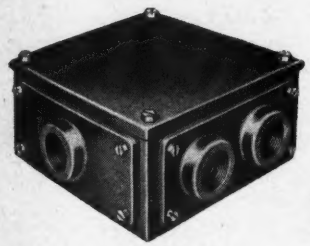
Type RSM without Hub Plates



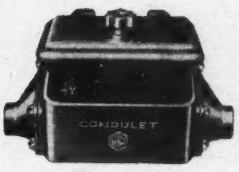
Type YSW without Hub Plates

No. 13

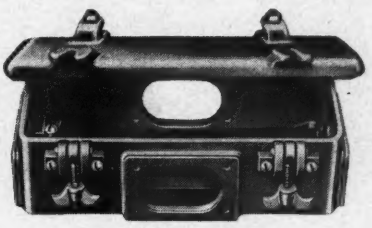
of a series of advertisements which demonstrate that CROUSE-HINDS "complete line" means much more than just a range of sizes — there is a wide variety of highly specialized types in each classification.



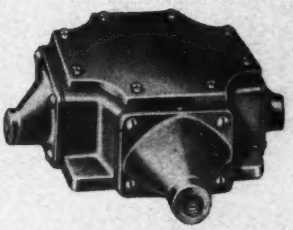
Type RS with Hub Plates



Type YYC with Hub Plates



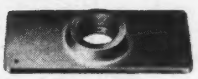
Type YWX without Hub Plates



Type AJX with Hub Plates

This drawing shows the use of Crouse-Hinds hub plate RSMP 6 as a pipe flange for attaching speakers to electrical conduit at drive-in theaters. There are many similar problems in all industries.

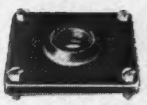
Type RSMP Two Hubs



Type RSP One Hub

Type YYAP One Hub 90° Back and Front

Type YYP Blank Plate



Type UGEB One Hub

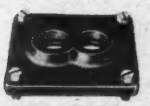
Type PED Pedestal Not Threaded

Type RSMP One Hub

Type RSP Two Hubs

Type YYLP One Hub 90° Left and Right

Type YYP One Hub Straight



Type UGEB Two Hubs

Type PED Pedestal Threaded Broken Away View

Type LOB Hub Plate Straight

Type RSP Three Hubs

Type YYSP Two Hubs 90° Left and Right

Type YYP Two Hubs Straight

Type UGEF

Type UGEE

Type LOB Hub Plate Angle

Type LOB Hub Cover

Type GS Hub Cover

Type GSG Hub Plate

Type CUH Hub Plate for Joining Conduit to a Pole

Type YYP 9

A Nationwide Distribution Through Electrical Wholesalers

CROUSE-HINDS COMPANY

Syracuse 1, N. Y., U.S.A.

Offices: Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland — Dallas — Denver — Detroit — Houston — Kansas City — Los Angeles — Milwaukee — Minneapolis — New York Philadelphia — Pittsburgh — San Francisco — Seattle — St. Louis — Washington. *Resident Sales Engineers:* Albany — Atlanta — Charlotte — Indianapolis — New Orleans
CROUSE-HINDS COMPANY OF CANADA, LTD., *Main Office and Plant:* TORONTO, ONT.

CONDULETS · TRAFFIC SIGNALS · AIRPORT LIGHTING · FLOODLIGHTS

Pardon the eavesdropping-

but did we hear MITCHELL mentioned?

HARRY: So you're getting rid of your old lighting, Tom. What kind of fluorescent are you going to install?

TOM: What kind? Why—I don't know—they're all pretty much alike, I suppose. What do you think about it, Harry?

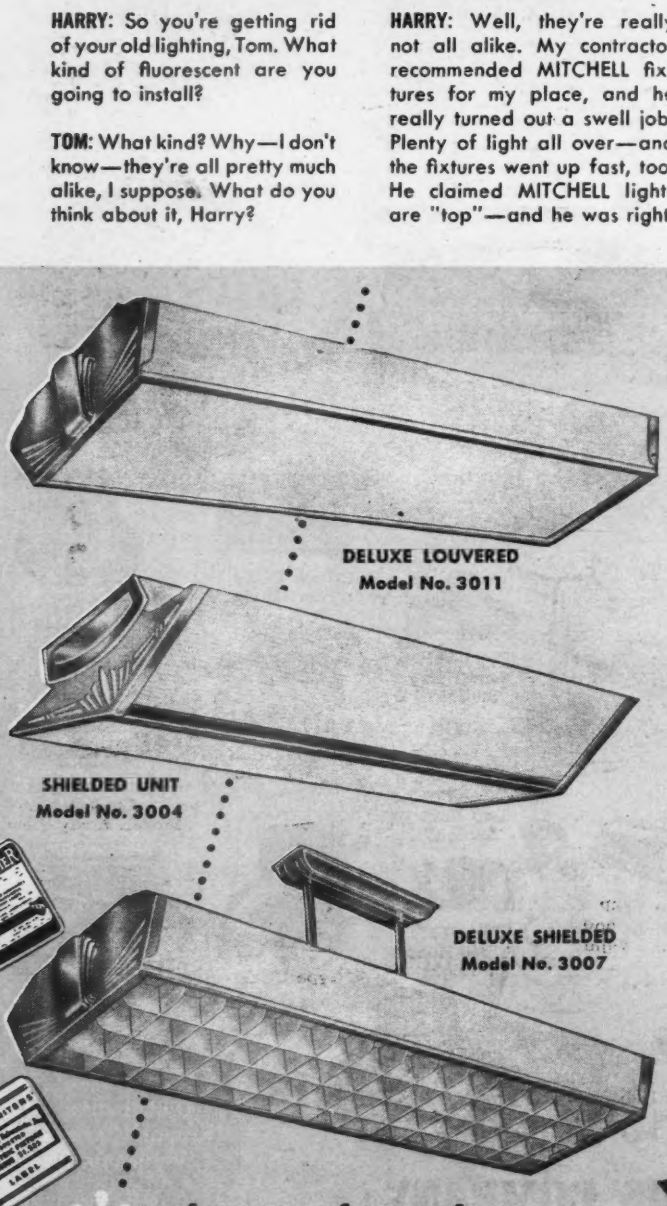
HARRY: Well, they're really not all alike. My contractor recommended MITCHELL fixtures for my place, and he really turned out a swell job. Plenty of light all over—and the fixtures went up fast, too. He claimed MITCHELL lights are "top"—and he was right.

TOM: Sounds like a good lighting tip.

HARRY: And that isn't all. The utilities man who calls on me was plenty impressed with the job—said I had as good a lighting installation as could be bought at any price.

HARRY: If I were you, Tom, I'd get the straight dope on what you need from a MITCHELL distributor.

TOM: Sounds O. K.—a recommendation like that is good enough for me. I'll look into it today. Thanks for the help.



There are thousands of prospects everywhere, ready for new lighting installations—and a big factor in sales is the word-of-mouth MITCHELL-boosting that has helped make MITCHELL the most popular fluorescent lighting line in the country. Everyone—*users, distributors, contractors, utility men*—knows and appreciates the efficiency and eye-appeal of MITCHELL Commercial Fluorescent Lighting—all are unanimous in their favorable opinion of this business-building, user-accepted line. Take a tip—MITCHELL is *your* best bet, too.

Mitchell Manufacturing Company
2525 CLYBOURN AVENUE, CHICAGO 14, ILLINOIS
Far West: *Complete Modern Plant and Sales Office at Los Angeles Serves the Entire Pacific Coast Area*
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* **the preferred COMMERCIAL LUMINAIRES**

MITCHELL

Makers of Commercial and Industrial Fluorescent Lighting Equipment Store Window Lighting • Spotlights and Floodlights • Desk Lamps • Portable Floor and Table Lamps • Bed Lamps • Ultraviolet and Infrared Health Lamps • Residential Lighting Specialties . . . Rad-i-Air Germicidal Units (made by Tru-Air Ultraviolet Products Co., Los Angeles.)

In the News

Pension Plan Approved

The Employees Benefit Agreement providing for employer contributions to an industry-wide pension fund for electrical workers was signed formally on Sept. 26 by officials of the International Brotherhood of Electrical Workers and the National Electrical Contractors Association.

The plan will go into operation soon after the Treasury Department approves the employers' payroll contribution as a deductible item of cost for tax purposes. This approval is expected soon. All other Governmental agencies having jurisdiction in the matter have given their approval and the Department of Labor has commended the plan.

The pension program affects more than 2,000 electrical contractors in all parts of the country and approximately 100,000 members of the IBEW. Members of the IBEW covered under the Pension Fund contribute 60 cents a month to the Fund and this sum is

Representatives at signing of IBEW contract (Seated left to right) E. J. Brown, International president; Lewis B. Schwellenbach, Secretary of Labor; E. C. Carlson, Chairman of NECA Labor Relations Committee; (Standing) G. M. Bugniazet, International Secretary; Robert W. McChesney, President of NECA; and Paul M. Geary, Executive Vice President of NECA

"Dang that electrician, Maw, I told him to put in floodlights!"

FOUR GOOD REASONS WHY

Linemen are Kleinmen

1. KLEIN PLIERS

For linemen and electricians. The perfect balance, sharp knives, fitted hinge and perfectly matched jaws help do any wiring job better and faster.

2. KLEIN-KORD TOOL BELT

Designed and constructed to provide the safety, comfort and convenience needed for fast, efficient work. Uniformity and toughness of "Klein-Kord" permit use of positive-action, tongue-type buckle. All sizes.

3. KLEIN CLIMBERS

Made in standard and lightweight models. Forged from special steel—individually tempered. Spring-tempered shanks for leg comfort. Gaffs are correctly shaped to provide sure footing while the lineman works.

Wherever you see a lineman, it's a safe bet he's a Kleinman, too. His preference for Klein equipment is more than just a craftsman's pride in wanting the best. Behind this preference is the knowledge that with Kleins, he can do any job better, faster—and with maximum safety.

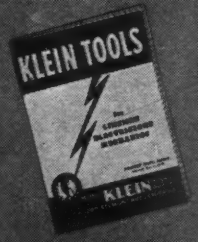
Because today's demand still exceeds supply, it may be some little time before your requirements can be completely filled. But your supplier will furnish the Klein equipment you need as rapidly as possible.

ASK YOUR SUPPLIER

Foreign Distributor: International Standard Electric Corp., New York

4. KLEIN-KORD SAFETY STRAP

Standard for the industry since their introduction, they provide maximum safety on every job. The Red Center unmistakably signals when the strap should be replaced.



The Klein Pocket Tool Guide showing the Klein line and containing useful tool information will be sent on request.

Since 1857

Mathias KLEIN & Sons

Established 1857 — Chicago, Ill., U.S.A.

3200 BELMONT AVENUE, CHICAGO 18, ILLINOIS

matched dollar for dollar by the employers' contributions.

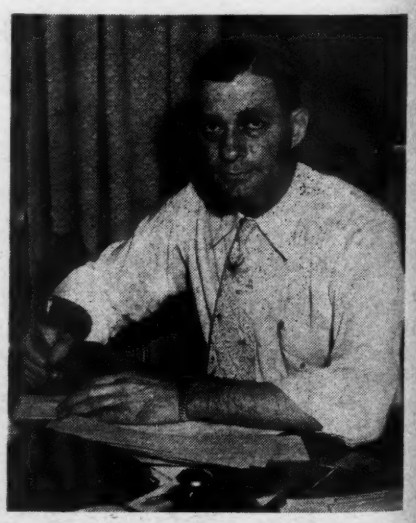
This provides a retirement benefit of $50 a month to members of the IBEW at age 65 after 20 years of continuous membership in the union.

Signing the agreement for NECA were Robt. W. McChesney of Washington, D. C., president of NECA; E. C. Carlson of Youngstown, O., chairman of the NECA Labor Relations committee, and Paul M. Geary, Washington, D. C., executive vice president of NECA. Signers for the IBEW were International President Ed. J. Brown, International Secretary Gus Bugniazet, and C. F. Preller, a member of the International Executive Council.

This is the first industry-wide pension agreement in the construction industry where traditionally workers are only intermittent employees of any one contractor. The agreement also sets a precedent of administration of such a complex collection and disbursement plan. Administration is by joint control through a Board of Trustees known as the National Employees Benefit Board for the Electrical Contracting Industry. This Board consists of 15 members—seven appointed by NECA, seven by IBEW and one by the Secretary of Labor. None of the members receives compensation.

Secretary of Labor L. B. Schwellenbach has appointed Edwin E. Witte of Wisconsin, formerly a member of the War Labor Board, the public member of the NEBB for a three year period. Mr. Witte, an economist, came to the WLB from the University of Wisconsin.

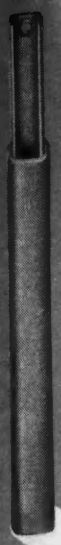
Basis of the pension plan is a payroll



Harold J. Hall, president of Hall Engineering Company — one of Detroit's leading electrical contracting firms — is a stickler for construction efficiency and a staunch advocate of power tools on the job. His firm has been doing considerable work on induction heating installations.

New Cannon Electric

assessment in an amount equal to 1 per



"LAY-IN" XTENSIONDUCT

For Wall or Ceiling Extensions

Here's the neatest thing in extensions for carrying wires along walls or ceilings. Eliminates difficult fishing through narrow channels. No ugly clips. Only the smooth, flat capping shows on finished work. **No. 111** holds two No. 14 wires.

"LAY-IN" METAL MOLDING

For On-The-Surface Wiring

It's easy to install wiring with NE Metal Molding. Screw down the base, lay-in the wires, snap on the capping.

No. 333 is only 7/16" thick, yet holds four No. 12 or No. 14 wires, or three No. 8 or No. 10 wires.

No. 888 is 11/16" thick, holds ten No. 14, No. 12 or No. 10 wires.

5 easy roads to BETTER LIGHTING

OVALFLEX ABC

Flat Armored Bushed Cable

Used for surface or concealed wiring. Only 7/16" thick. Can be installed and covered within plaster thickness. Bends flatwise and edgewise. There's a complete line of NE shallow Outlet and Switch Boxes and flat Connectors for Ovalflex.

SURFACEDUCT

The New Raceway for Industrial and Commercial Lighting

Another lay-in surface raceway (2-1/8" x 1-5/8" cross section) for use with all types of suspended lighting, cove, trough or window lighting. Banks of lights can be switch-controlled. Interconnectable with other systems. Unique bridge anchors capping and devices securely; serves as wire retainer when Surfaceduct is mounted overhead.

OVALDUCT

Rigid Oval Steel Raceway

An "in-the-surface" raceway for concealed extensions from existing outlets. Only 13/32" thick. Easily installed within plaster thickness. Electro-galvanized for protection against rust. In addition, the inside is enameled for extra smooth fishing.

WHEN new lighting requires extensions, changes or detours in wiring systems, here are 5 approved raceways to make the job easy. Designed to meet the most exacting architectural or industrial requirements . . . Quick and inexpensive to install. Complete interconnectable fittings to take care of every situation. Write for installation data.

NATIONAL ELECTRIC PRODUCTS
WIRING SYSTEMS
WIRES AND CABLES

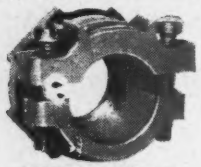
National Electric
PRODUCTS CORPORATION
Box 897 — Pittsburgh 30, Pa.

New Cannon Electric

CONDUIT FITTINGS

Fast Delivery!

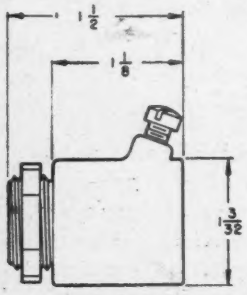
Cannon Electric has diverted a portion of its large production facilities to the manufacture of conduit fittings in aluminum and zinc to meet the demand of electrical contractors everywhere. Several millions of fittings have already reached the market. The same quality for which Cannon Plugs are widely known is found in these low-priced items.



TYPE CNT-1
Box Connector
(with reversible clamp)

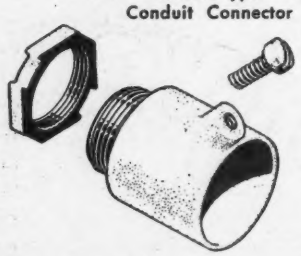
Exploded view parts CNT-1

Type CNT-1 is a conduit fitting with reversible clamp for armored cable, non-metallic sheathed cable, CNX concentric covered neutral house wire, and rubber jacketed portable cords, having an outside diameter of from 5/32" to 21/32". Only one screw needs to be removed for clamping. Body of the clamp is aluminum alloy; clamp is zinc. The reversible clamp may be used for small size wire. Packaged in lots of 100.



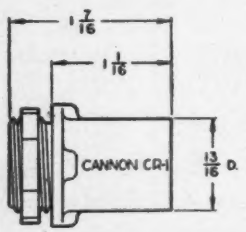
Side view Dimensional sketch

TYPE CF-1
Screw Type
Conduit Connector



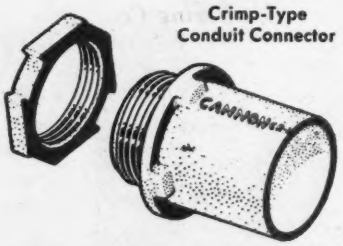
The CF-1 is built to accommodate ½" flexible metallic conduit, single set screw type. Material is diecast aluminum or zinc, depending upon the conditions of metal supplies. ½-14 American National Standard pipe thread. Packaged in lots of 500.

Type CR-1 is a crimp-type connector for thin wall ½" EMT conduit, indenter type. Material is diecast zinc. ½-14 Am. Nat. Stand. pipe thread. Packaged in lots of 500.



Side vie Dimensional sketch

TYPE CR-1
Crimp-Type
Conduit Connector



Contact a Cannon Engineering office, your local jobber, or write factory for CF-1 Bulletin and prices. Address Dept. J-231, Cannon Electric Development Company, 3209 Humboldt Street, Los Angeles 31, California.

New—CCR-1 (EMT) ½" Conduit Coupling.

Cannon Electric is a leading manufacturer of multi-contact electric connectors for aircraft, radio, instruments, batteries, television, radar, public address systems, power, and general electrical applications.

CANNON ELECTRIC
DEVELOPMENT COMPANY
3209 Humboldt Street, Los Angeles 31, Calif.
IN CANADA: CANNON ELECTRIC CO., Ltd., TORONTO

SINCE 1915

CANNON ELECTRIC

assessment in an amount equal to 1 per cent of the gross labor payroll paid by electrical contractors to members of IBEW. This sum is collected locally from each electrical contractor. The Board makes quarterly payments to the existing Pension Benefit Fund of the Brotherhood of an amount equal to the total amount paid into that fund by all members of the Brotherhood for the same quarter.

Chicago Contractors Study Store Lighting

The first phase of the Chicago Electric Association's program to promote relighting of local stores was completed October 7. Aimed at electrical contractors and wholesalers, it comprised a series of four evening lecture demonstrations conducted by the Chicago Lighting Institute and held in the Commonwealth Edison Company's assembly hall.

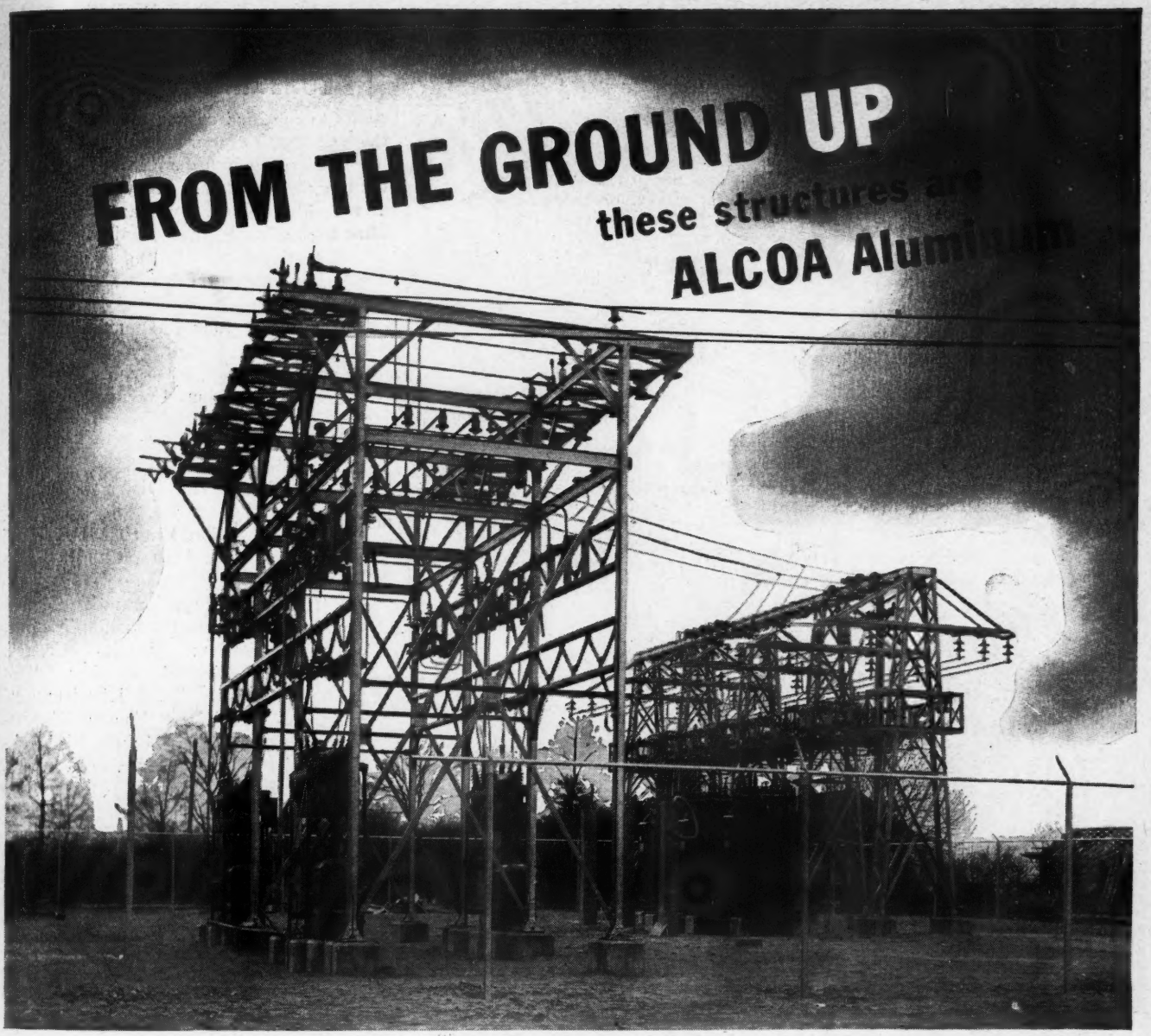
Opening the initial session on Sept. 10, Carl Zersen, manager, Chicago Lighting Institute gave an illustrated talk on modern store lighting to approximately 200 contractors and wholesalers present. G. K. Hardacre, IES president and manager, lighting sales, Public Service Co. of Northern Illinois, reported on store owners' reactions to modernized lighting. Concluding the session, R. G. Raymond, president, Chicago Lighting Institute and manager, electricity sales, Commonwealth Edison Co., outlined several ways to sell modern lighting.

At the second lecture on Sept. 24, Carl Zersen presented a comprehensive review of lamps, and luminaires, illustrated by film, slides and demonstration equipment.

On Sept. 30, the entire meeting was devoted to a study of lighting layouts. A. W. Larson, lighting engineer, Westinghouse Electric Corp. explained methods of figuring and making such layouts.

Lighting sales and economics was the topic of the final meeting. L. V. James, lighting consultant, General Electric Co., presented analyses and comparison costs of installations; told the group how to "sell lighting up." The course was concluded with remarks by P. D. Cornelisen, sales manager, Curtis Lighting, Incorporated.

Chairmen of the various sessions were: W. T. Reace, president, Electric Association of Chicago; Herbert Binner, secretary, Cook County Electrical Contractors Association; R. W. Staud, director, public relations, Benjamin Electric Mfg. Co.; and J. Walter Collins, secretary, Elec. Contr. Assn. of City of Chicago.



4kv. and 11kv. Powell Avenue substations of the Pennsylvania Electric Company at Erie, Pa. Fabricated by: Railway & Industrial Engineering Company of Greensburg, Pa.

All parts of these structures are nonrusting Alcoa Aluminum. Painting is eliminated, cutting maintenance costs, reducing service interruptions, decreasing hazards.

Lightweight assemblies permit more shop fabrication—less field work—save erection time and costs.

Standard Alcoa Aluminum shapes, plate, bolts and rivets—lightweight, strong, highly resistant to corrosion, readily available—make it possible for you to obtain these advantages in your structures.

For design data and prices, call the nearby Alcoa office. Or write ALUMINUM COMPANY OF AMERICA, 2197 Gulf Building, Pittsburgh 19, Pa.

ALCOA FIRST IN ALUMINUM

What's NEW in Floodlighting

GOODRICH *has the answer!*

And the answer is *"Yes"* to any floodlighting need! No matter what the area to be illuminated... no matter what intensity is required . . . or what type of mounting is called for.

Designs have been developed and improved to bring you the most advanced features in floodlighting equipment. There's new mechanical simplicity for easier wiring . . . easier installation . . . easier servicing. Plus ever-dependable Goodrich quality, the best possible protection for your investment.

Pictured are four of the many floodlight styles in the Goodrich line . . . each equipped with cast aluminum mountings to prevent corrosion . . . and finished in permanent porcelain enamel or Alzac aluminum to retain their high factor of reflection.

Whatever your problem in outdoor illumination — for industrial or recreational areas — Goodrich provides the fixtures best suited to that specific job. And Goodrich engineers will gladly help with your selection.

RLM

Sold Through Electrical Wholesalers

GOODRICH
ELECTRIC COMPANY
4600 BELLE PLAINE AVENUE, CHICAGO 41, ILLINOIS

D. W. Tracy Elected President IBEW

At the 22nd convention of the International Brotherhood of Electrical Workers held in San Francisco last month, Dan W. Tracy was elected president; G. M. Bugniazet, secretary; Charles M. Paulsen, chairman of the Executive Council; and William A. Hogan, treasurer.

Vice presidents elected for the districts were: John Raymond, Windsor, 1st District; John J. Regan, 2nd District; James Liggett, Schenectady, 3rd District; Gordon Freeman, Chattanooga, 4th District; G. X. Barker, Atlanta, 5th District; M. J. Boyle, Chicago, 6th District; W. L. Ingram, Fort Worth, 7th District; Wallace C. Wright, Pocatello, 8th District; J. Scott Milne, San Francisco, 9th District; and J. J. Duffy, Chicago, 10th District.

The International Executive Council consists of Louis Marciante, Trenton, First District; Charles Caffrey, Springfield, Second District; Oliver Myers, Toledo, Third District; Carl Scholtz, Baltimore, Fourth District; H. H. Broach, Des Moines, Fifth District; Lawson Wimberly, Port Arthur, Sixth District; Charles J. Foehn, San Francisco, Seventh District; and Keith Cockburn, Stratford, Eighth District.

Twin City Groups Hold Lighting School

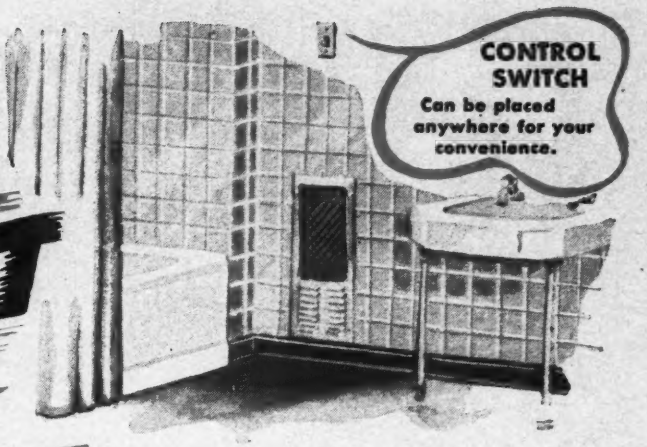
A store lighting sales program, developed specifically for electrical contractors, was recently presented in Minneapolis and St. Paul under the sponsorship of the contractors association in both cities. General Electric Lamp Department personnel prepared and gave the program in a series of four evening sessions.

Subjects covered included: How to locate and develop prospects and meet their individual needs with modern lighting tools; methods which enhance the profit possibilities from lighting jobs; how the electrical contractor can realize his share of the present market for new lighting installations.

Sound slide films, movies, charts and skits were employed at each meeting to illustrate improved sales practices; how to best specify lighting; how improved techniques minimize cost; how satisfactory lighting installations become best advertisements.

Similar meetings for contractors in the Duluth-Superior area were held during September.

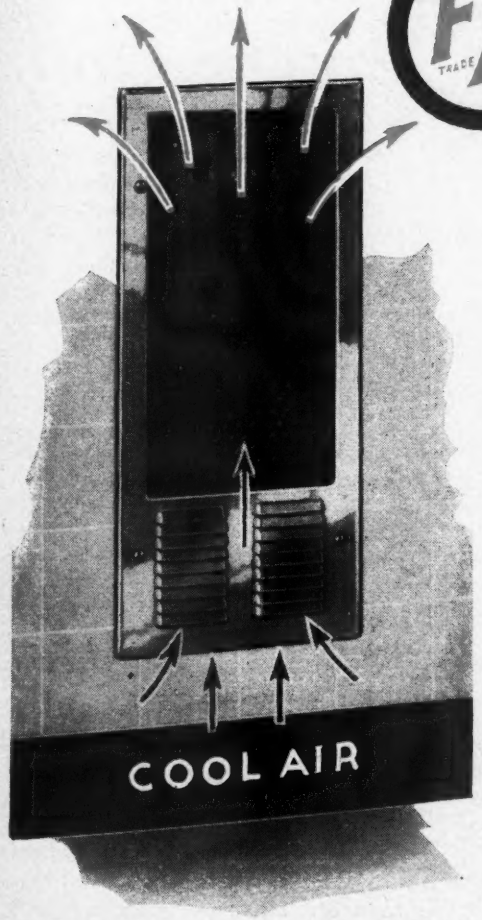
Instant HEAT Quick COMFORT



FOR THOSE **CHILLY AUTUMN** MORNINGS....

WHEN YOU INSTALL THE "ELECTRIC"

FA QUIKHETER



FA Quikheters are available in single units of 1000 and 1500 watts and twin units of 2000 and 3000 watts.

Quick, comfort-giving heat with the simple flip of a switch! That is what the new, improved Built-in FA Quikheter affords.

FA Quikheters are ideal for those damp, chilly fall and winter days — days when regular heating plants are off... or for taking the chill out of the house on cold, blustery winter days.

Equipped with a genuine Nichrome heating element that should never wear out, these quick-acting units send forth a glow of warm air that will change the temperature of the average room in three to five minutes.

There is no need to wait for the heater to heat-up. There is no lost motion or electricity — no waste of fuel. FA Quikheters are hot the minute they are turned on. And they are neat and attractive, too—ideal for bathrooms, kitchen, and other rooms. They can be easily installed in the wall or in the base of mantles.

For maximum home comfort and convenience, therefore, install Built-in FA Quikheters — today's contribution to tomorrow's better living. For details write for bulletin No. 73 or contact your nearest electrical dealer. Be sure, however, to specify FA Quikheters.

MAKERS OF...
BUSDUCT
PANELBOARDS
SWITCHBOARDS

Frank Adam
ELECTRIC COMPANY
St. Louis, Missouri

SERVICE EQUIPMENT
SAFETY SWITCHES
LOAD CENTERS
ELECTRIC QUIKHETER

All available indications point to the fact that lead for cable coverings will be short for the next year at least. But this lead shortage shouldn't unduly upset you for ANHYDREX Cables with a hard service rubber jacket will give you the dependable service you want without many of the difficulties that are inherent in the use of a lead sheath.

Simplex-ANHYDREX Underground Cables can be installed directly in the ground or they can be used in ducts. They are not subject to electrolysis or corrosion. Acid or alkaline soils have no effect on them. Sheath currents resulting in galvanic action cannot occur with a rubber jacket.

Simplex-ANHYDREX Underground Cables were the first to be offered with a low water absorption insulation and a hard service rubber jacket for use underground, without ducts.

Beat the lead shortage by buying and installing Simplex-ANHYDREX Underground Cables. A new ANHYDREX Underground Cable book is ready. We'll gladly send you a copy on request.

Simplex-WIRES & CABLES

SIMPLEX WIRE & CABLE CO. 79 SIDNEY ST. CAMBRIDGE 39, MASS.

Eastern Montana Contractors Organize

Eastern Montana electrical contractors recently organized a trade association to advance the status of the electrical contractor in that region and to reap the benefits that both the business man and consuming public receives from the organized activities of trade groups.

Heading the organization is L. J. Lee, Sidney, Montana. Carl Benson, Sidney, is vice-president; Fred Roesner, Fairview, secretary-treasurer. Directors of the new group include the officers and following members: H. F. Schulz, Miles City; M. C. Midby, Plentywood; and Millard Johnson, Poplar, Montana.

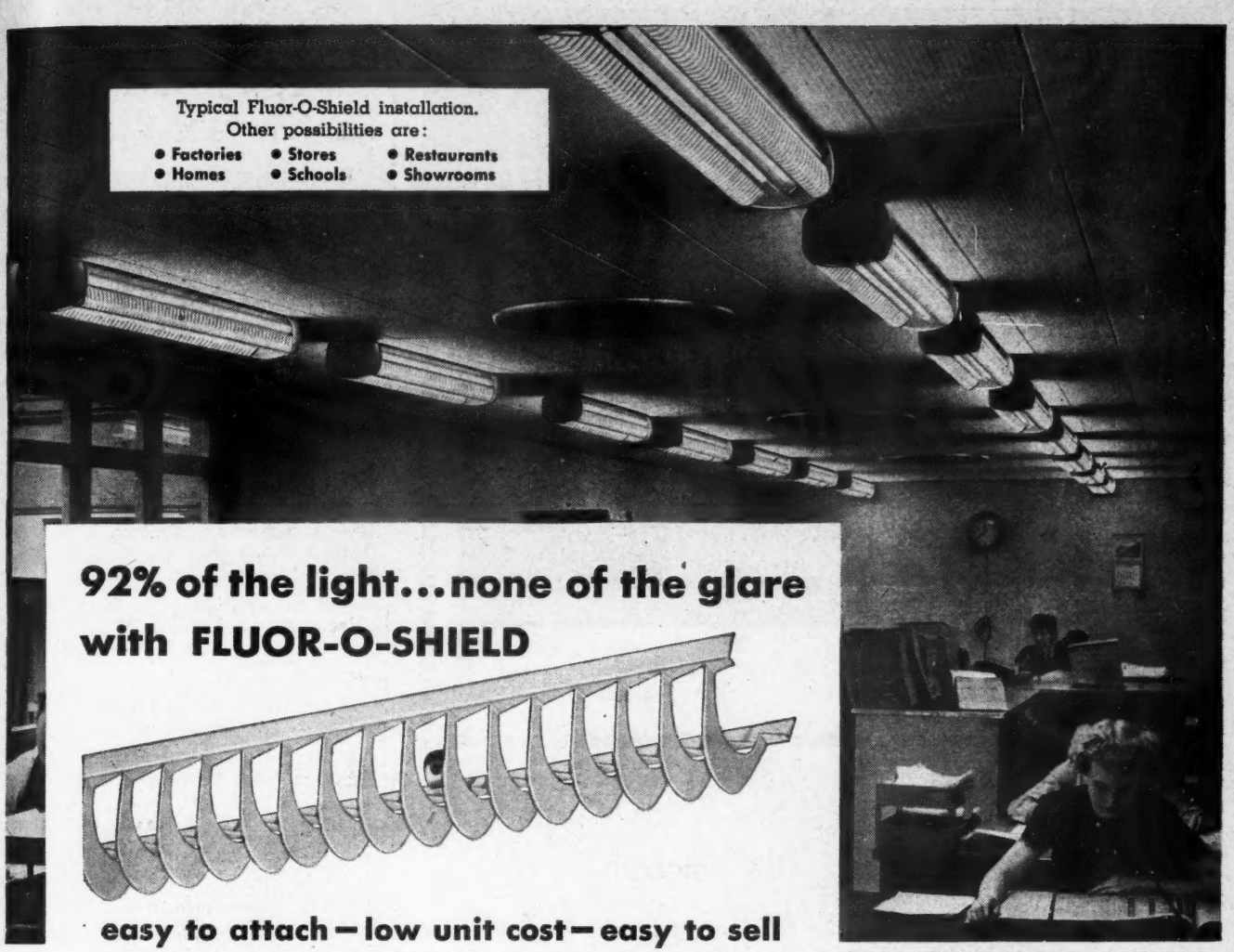
An affiliation with the Minnesota Electrical Council, Minneapolis, is among the early plans of the new organization, it is reported.

Dakota Group Joins Minnesota Council

On February 1, 1947, the North Dakota Electrical Contractors Association, with a membership of 75, will become a full affiliate of the Minnesota Electrical Council, Inc., Minneapolis. This group affiliation results from action taken at the June convention of the North Dakota group at Dickinson, N. D. Minnesota Electrical Council directors approved the plan at their Duluth meeting.

All sessions at the North Dakota meeting were well attended. Action was taken to assist the North Dakota State Board of Electricians in its efforts to institute an inspection system in connection with the filing of wiring affidavits similar to those now used in Minnesota. Just prior to the last war, the North Dakota State Electrical Law was amended to provide for the wiring affidavits and an inspection system. However, these provisions were not enforced during the emergency. In the interest of more rigid enforcement of the Law, contractors went on record to sponsor or underwrite the services of a full time inspector. Since the present income of the State Board is sufficient for only limited field service, prepaid inspection fees will be instituted to help cover full time inspection costs. The committee includes: B. J. Reyer, Fargo, Chairman; Carl Wild, Milton; and Fred Miller, Dickinson.

Highlights of a new program of cooperation with electrical contractors and dealers, outlined by Mark Walsh, merchandise manager, Montana Da-



Typical Fluor-O-Shield installation.
Other possibilities are:
• Factories • Stores • Restaurants
• Homes • Schools • Showrooms

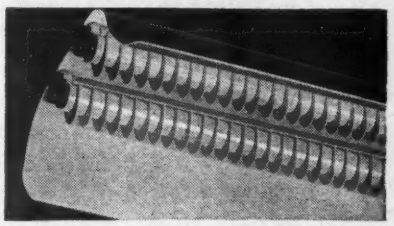
92% of the light...none of the glare with FLUOR-O-SHIELD

easy to attach—low unit cost—easy to sell

Multiple sales of Fluor-O-Shields are turning in quick profits for dealers and contractors all over the country. Here's the reason: the numerous advantages of Fluor-O-Shields can be demonstrated right at the point of use without expensive sales technique. Endorsed by lighting engineers, lamp tube manufacturers, and electrical testing laboratories, Fluor-O-Shields give *92% of the light* of bare fluorescent lamps, with none of the glare. This results in better lighting for better working conditions, more working efficiency. Lightweight, ease of attachment and all-around efficiency make Fluor-O-Shield the most practical light diffuser on the market. If your distributor does not stock Fluor-O-Shields, write for name of our distributor, or ask your distributor to write us.

- **Fit most exposed lamp fluorescent fixtures.**
- **Simply snap on or off lamp tubes—instantly attached or removed without bolts, screws or tools.**
- **No strain on lamps or sockets. 1-piece, light-weight aluminum, finished in white baked enamel.**
- **No soldered connections to break or pull loose. No horizontal surfaces to collect dust or dirt.**
- **Modernize and improve appearance of exposed lamp fixtures at surprisingly low cost.**
- **Low stock investment, convenient to stock, packed nested to take little space, move out rapidly.**
- **Combination sales item along with fluorescent lamp tubes and starter replacements.**
- **Available in two sizes for 20W and 40W lamps. Shipped ready for immediate attachment.**

Offices of Starr Machinery Co., Seattle, Wash.



Fluor-O-Shields fit most exposed lamp fixtures. Eliminate glare, eyestrain, stroboscopic effect.

Snap-on clips provide instant attachment or removal without bolts, screws or tools. Burned out lamps changed quickly and easily.

$1.95 40 watt 46⅞ in.

$1.25 20 watt 22⅞ in.

★ FLUOR-O-SHIELD*

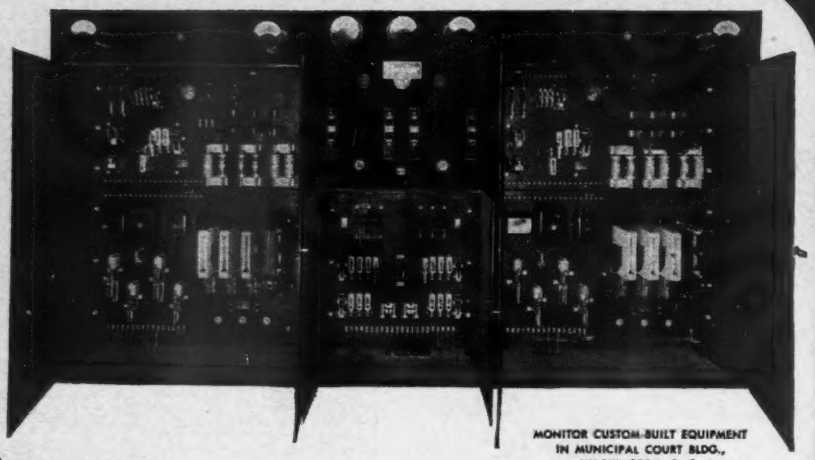
Light Diffuser for Fluorescent Lamps

Represented Nationally by
D. E. SANFORD CO.
NEW YORK • BOSTON • PHILADELPHIA
ATLANTA • CLEVELAND • CHICAGO
ST. LOUIS • SAN FRANCISCO
LOS ANGELES • DALLAS • SEATTLE

*Trade Mark—Patent Pending

★ FLUOR-O-SHIELD* by CAMFIELD MANUFACTURING COMPANY • GRAND HAVEN, MICHIGAN

Our Specialty
CUSTOM-BUILT MOTOR CONTROLS



MONITOR CUSTOM-BUILT EQUIPMENT IN MUNICIPAL COURT BLDG., WASHINGTON, D. C.

Designed and Built to your Specifications

One of the newer structures in Washington is the Municipal Court Building. At time of construction, engineers set forth many unusual specifications and requirements for control of air-conditioning apparatus.

Because of its unique ability to design and build electric motor control equipment to exact customer specifications, Monitor got the job. Above you see the result—with all requirements met in a "more than satisfactory" manner.

For over 50 years Monitor has specialized in building *your* specifications and *your* requirements into specialized controls of all types, for all purposes—including printing presses, machine tools, synchronous motors, pumps, laundries, ventilating fans, dairies and many more.

So when you have an unusual control problem, be sure to consult your nearby Monitor Field Engineer. His service is prompt, efficient . . . and his specialized knowledge will save you time and money.

"If it's Custom-Built Monitor Builds it Better"

The Monitor Controller Company
BALTIMORE 2, MARYLAND
CANADIAN AFFILIATE • CANADIAN CONTROLLERS LTD • TORONTO, ONTARIO, CANADA

kota Utilities Company, were a proposed allowance of $20 to help pay for range wiring and water heater installations; also an extensive promotional program to sell commercial lighting through the electrical contractors.

An extensive discussion on wiring methods and 1946 NEC changes was led by George Garney and Glenn Rowell. Ideas on how to develop the commercial lighting market were presented by R. Walker, General Electric Co., and G. Bunn, Westinghouse, with the aid of colored movies. Not only prepare to meet but *beat* postwar competition at its own game by offering modern store and shop facilities and superior service, urged Wm. A. Ritt, secretary-manager, Minnesota Electrical Council, Inc., while addressing the contractors and dealers.

Ralph Rice, field representative, REA, assured the convention delegates of full cooperation from REA in the solution of the problems that will come with a greatly expanded rural electrification program.

Elected to serve as officers of the North Dakota group for the ensuing year were: president—Clyde Keiley, Grafton; vice president — Chester Brown, Dickinson; secretary-treasurer—George Hilstad, Mayville. Members of the Board of Directors are: B. J. Reger, Fargo; Fred Roesner, Fairview (Montana); M. A. Slettum, Turtle Lake; Art Oksendahl, Rugby; and W. A. Curry, Langdon.

NISA Chapters Elect Officers

Officers of various chapters of the National Industrial Service Association throughout the country elected at recent meetings are listed below.

Michigan Chapter — recently organized in Detroit. President—C. J. Cannon, Nimmo Electric Co.; vice-president—James G. Spaulding, Jr., Spaulding Electric Co.; treasurer—Charles Howard, Howard Electric Company. All are from Detroit.

New York Metropolitan Chapter—President—H. G. Griffith, L. S. Belyea Co., Jersey City, N. J.; vice-president—J. Milton Burner, Electric Service Repair, Paterson, N. J.; treasurer—A. Bonahur, S. J. O'Brien, Inc., New York City. Ex-president is H. A. Schreck, H. A. Schreck Co., Mount Vernon, N. Y.

Cincinnati Chapter — President — Selden F. High, The Sullivan Electric Co.; vice-president—E. B. Conradi, Barkley Electric Co.; secretary—B. G. Hendrixson, Glow Electric Co.; treasurer—J. B. Matlock, Matlock Electric Company.

RELIANCE

AUTOMATIC
TIME SWITCHES

THE dependability of RELIANCE Automatic Time Switches has been proved in emergency as well as in normal times. They are giving complete and reliable service under many and varied conditions—a factor of paramount importance particularly in these times when constant good service is so essential. RELIANCE Switches are easy to install economical in operation, and meet a wide variety of needs. The present sales possibilities should interest you—tap this rich source of today's business.

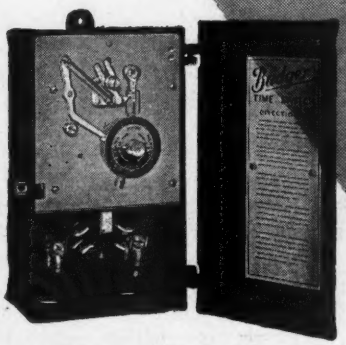
Catalog and price sheets available on request.

RELIANCE Model W Synchronous Electric Time Switches

Completely automatic—extremely simple, compact, economical—three types cover practically every requirement. Built to highest standards of accuracy.

ASTRONOMIC TIME SWITCH

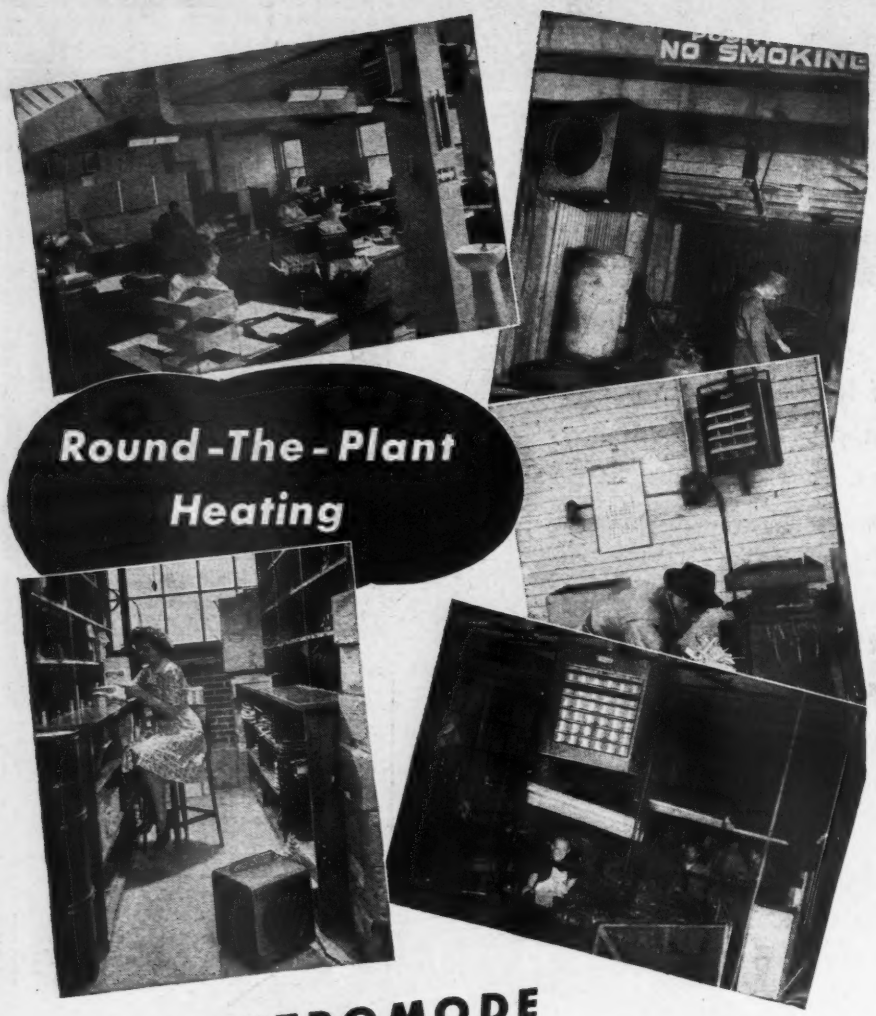
"The Model "W" Astronomic types are particularly popular for advertising illumination. The "on" operation changes daily to correspond with local sunset time, eliminating the necessity of resetting the dial as the days become longer or shorter.



BADGER Synchronous Automatic Time Switches

Heavy duty time switch with capacity to meet a wide variety of requirements.

RELIANCE AUTOMATIC LIGHTING CO.
1907 MEAD STREET, RACINE, WISCONSIN



Round-The-Plant Heating

with ELECTROMODE UNIT HEATERS

Heat—anywhere in the plant—in factory, stockroom, office, warehouse, is possible with the installation of Electromodes. Wherever circuit wires can be run,—to isolated buildings, or beyond central heating system range,—Electromodes can furnish clean, safe, heat economically.

For local or supplementary heat when some departments are running overtime, for week-ends, holidays and inventory periods, Electromodes save on heating costs. There is no heat-loss en route from wires to heater. No current is used when not "on."

Cut-away view of exclusive Electromode Finned Heating Element as used for years to heat U. S. Submarines. No fire, shock or explosion hazards.

Long-life service, free from fire, shock or explosion hazards, is another Electromode advantage. The patented heating element is insulated, sheathed and embedded in a one-piece finned aluminum casting. There are no exposed hot wires or glow elements. Standard capacities, 1.5 KW to 60 KW. Ask your Electrical Wholesaler to recommend appropriate sizes.

ELECTROMODE CORPORATION, Rochester 3, New York.

ELECTROMODE
Electric Unit Heaters

Send for latest Bulletin 45-U and Heating Analysis Form.

Wadleigh Heads Indiana Group

O. F. Wadleigh, Sanborn Electric Company, Indianapolis was chosen president of the recently organized North-Central Electrical Contractors Association (Indiana). Vice-president is E. L. Moorhead, Moorhead Electric Company, Marion, who will also represent the group on the NECA Board of Governors. H. B. Lammers, Lammers Electric Co., Lafayette, was elected treasurer and H. G. Frankhouse, Frankhouse Electric Co., Indianapolis is serving as temporary secretary until a full time one can be employed.

In addition to the above officers, the following are members of the Board of Directors: R. O. Lock, Central Electric Co., Fort Wayne; Charles D. Hills, Koontz-Wagner Electric, Inc., South Bend; M. E. Grandidier, Sunbeam Electric, Terre Haute; and I. C. Frakes, Frakes Electric Co., Indianapolis.

BOOK REVIEWS

Encyclopedia of Safety Aids

For the first time in a single volume, a complete reference is available listing manufactured products and recommended practices for promoting safety in all branches of industry. Over a thousand products, devices and items of equipment used in safety, first aid, hygiene, health conservation and fire protection are listed in Best's 1946 "Safety Directory" with brief discussions of their purpose, construction and application. Items include all types of protective clothing; head, eye and foot coverings; fire fighting and welding equipment; non-slip floor coverings and stair treads; scaffolding; dust exhausts; safety practices; machine guards and related aids. With the directory cross-indexed by product, purpose and manufacturer, the safety director, purchasing agent, medical supervisor or plant manager can quickly find what product to use, when and how to use it and where to procure it. Manufacturers are listed under each type of equipment and also alphabetically by states. Comments, recommendations, descriptions and illustrations are from insurance inspectors and industrial engineers as well as the manufacturer of each item. The 8½ by 11¼-inch volume contains 352 pages, is bound in stiff blue leatherette and is priced at $5. Published by Alfred M. Best Co., Inc., 75 Fulton St., New York 7, N. Y.

Professor SPELCOR Says:

Why Waste Time Shopping Around?

When you can get 5 Lines of Dependable Electrical Products From One Reliable Source!

The less time your organization spends in buying and handling the supplies you need, the more profit you add to your part in getting quality electrical products to your customers. The logical thing to do, therefore, is to centralize your source of material. Buy as many things as you can from one manufacturer, and cut the cost of your operation.

Spero manufactures *5* lines of products which total more than *155* separate items in its large, modern Cleveland plant. All Spero products are distributed only through verified electrical wholesalers.

- **Fluorescent Luminaires**

  For commercial, industrial and residential installation. Designed and engineered for specific application. Spero will soon be making deliveries on the new "MSB" (Minimum Surface Brightness) glass-enclosed fluorescent luminaire, which produces a minimum of glare without loss of efficiency.

- **Reflectors**

  Industrial reflectors with one piece seamless construction. "Plastox" white reflecting surfaces, (86% reflection factor). Sizes up to 750W.

- **Floodlights**

  Open types and outdoor weatherproof types fitted with prismatic lens. Finished in "Duralum". Sizes for lamps from 150W to 1500W. Also yard lights and cargo lights.

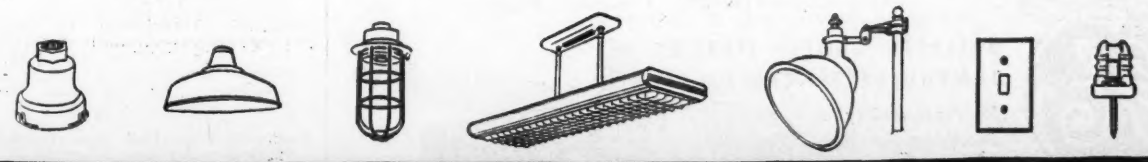
- **Vaporproof Units**

  Pendant, "X", bracket, or outlet box mounting types. With or without wire guards. Reflectors and accessories available. Lamp sizes 50 to 300W.

- **Construction Equipment**

  Zinc diecast sockets, porcelain wireholders (lag or machine screw type), multiple point house brackets, switchplates,– all made of high quality materials to Spero's high design standards.

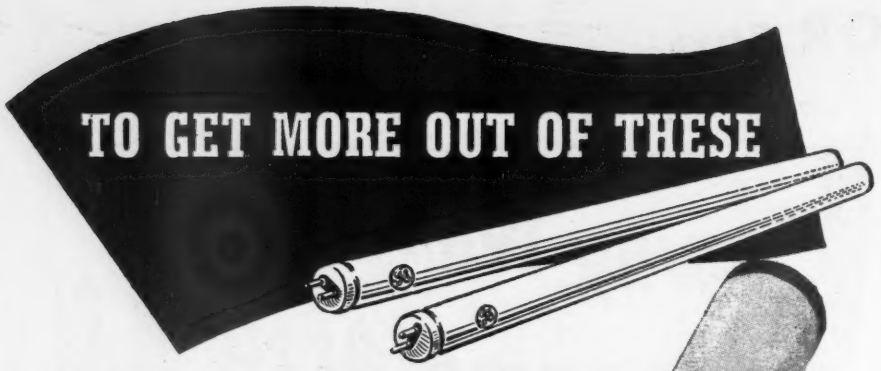
Get all the facts. Write for Bulletin No. 10 describing Spero's five lines.



THE SPERO ELECTRIC CORPORATION

18222 LANKEN AVE. ★ CLEVELAND, OHIO

TO GET MORE OUT OF THESE



...BACK 'EM UP WITH ALL THESE

WATCH DOG* STARTERS

Here's the starter for fluorescent lamps that eliminates *blink and flicker.* A "cut out" opens the circuit when lamps reach the end of their useful life. Outlasts ordinary starters 5 to 1. Simplifies maintenance and relamping. Types for lamps from 15-to 100-watts.

ROTATING LOCK LAMPHOLDERS

Among G.E.'s full line of lampholders for fluorescent fixtures, this is the most popular type. When lamps are inserted and rotated, they *lock* into place. Made in white or black plastic in mounting combinations to meet the needs of any standard fixture.

TWIN TURRET LAMPHOLDERS

A strong, practical support for two 40-watt lamps and starter. Each lamp is inserted by depressing either face of holder until lamp end snaps into position. Twin Turret Lampholders are easily mounted on any flat surface.

SLIMLINE LAMPHOLDERS

These white plastic lampholders are styled and finished for modern fluorescent fixture lighting with the new Slimline Lamps. Lamps are easily inserted, firmly held. Companion types are particularly suited for narrow channel mounting.

*Trade-mark Reg. U. S. Pat. Off.

*For information on these and other G-E accessories for fluorescent lighting (including the new Circline accessories), write Section **G1-108** Appliance and Merchandise Dept., General Electric Company, Bridgeport, Conn.*

BALLASTS—LAMPS—STARTERS
LAMPHOLDERS—CABLE
for dependability in fluorescent lighting

GENERAL ELECTRIC

Post War Housing Analysis

"Housing Digest", an unbiased report sponsored by the Electrical Association for Women and prepared by the Association for Planning and Regional Construction, demonstates that postwar reconstruction is receiving international attention and is the subject of extensive study and debate in Great Britain, Canada, Sweden and other nations as well as in the United States. Presenting actual extracts from housing reports issued between 1941 and 1945, the book illustrates the trend of thinking by representative national organizations, the building and buying public, architects, contractors and governmental officials. It is therefore a resume and analysis of the planning and progress in connection with lighting, heating, insulation, ventilation, space requirements for families of various sizes and from different economic brackets, prefabricated structural or utility units, landscaping and neighborhood planning.

Although prepared and published in England, material has been gathered from several lands, including our own, resulting in a report that is free from individualized opinion. Standards are suggested for housing families in multiple dwellings, for construction, equipment and design. The parts played by women in the home, in government and in educating students in problems of economics, hygiene and house management are also discussed.

Printed in two colors, the 120 page book, measuring 7½ by 10 inches, is published by Art and Educational Publishers, Ltd., London, and is priced at 15 shillings.

DATES AHEAD

George Washington Chapter IAEI—Board Room, District Bldg., Washington, D. C., October 14.

International Municipal Signal Association, Inc.—Annual Meeting—Miami Colonial Hotel, Miami, Fla., October 14 to 17.

National Electrical Contractors Association—Annual Meeting, Ritz Carlton Hotel, Atlantic City, N. J., October 14-18.

Electronics Trade Show—Second annual show, Elks Temple, Los Angeles, Calif., October 18-20.

Ohio Chapter IAEI—Gibson Hotel, Cincinnati, Ohio, October 24.

National Association of Refrigeration Contractors—Annual meeting, Cleveland, Ohio, October 27 and 28.

National Electrical Manufacturers Association—Annual meeting, Hotel Traymore, Atlantic City, N. J., week of October 27.

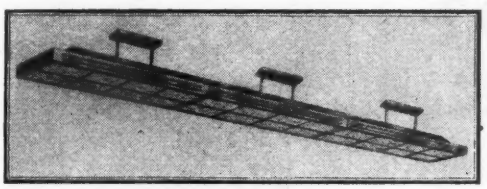
National Electrical Manufacturers Association — Annual Meeting — Marlboro-Blenheim and Claridge Hotels, Atlantic City, N. J., October 28 to November 2.

All Industry Refrigeration and Air Conditioning Exposition—Public Auditorium. Cleveland, Ohio, Oct. 29-Nov. 1.

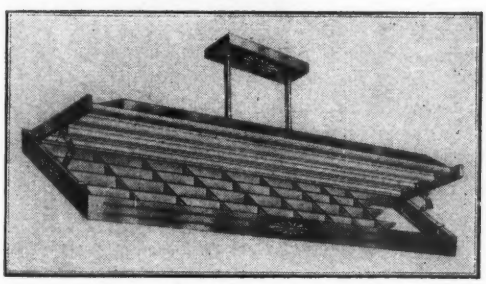
National Farm Electrification Conference—Chicago, Ill., November 7-8.

International Municipal Signal Association—51st Annual meeting, McAllister Hotel, Miami, Fla., November 11-14.

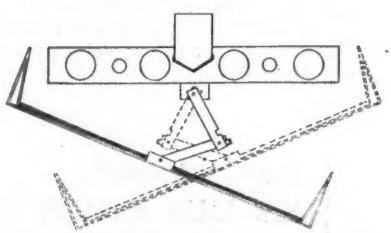
EVERY MOBILIER IN YOUR STOCK IS ADAPTABLE FOR EVERY TYPE OF INSTALLATION



A. Mobilier is easily installed for continuous run, either suspension or surface mounted.



B. Easy cleaning and servicing. Hinged frame swings down from a pivoted center.



C. Construction detail of safety locking device which is used on 500 line Mobiliers.

Mobilier Lighting Units present the ideal combination for good lighting, ease of installation and maintenance, together with adaptability to various installation requiremnets.

Beautifully designed and engineered for excellent lighting performance, each Mobilier Unit may be used as a

- **Suspension Unit (single or double stem)**
- **Surface Mounting Unit**

or

- **Continuous Run**

Very few accessories are needed—and these are readily available.

By concentrating our huge production facilities to a limited series of most practical styles, with the wide series of applications made possible by our stock of accessories, the Mobilier line offers the unusual values in quality lighting equipment.

The Royal Mobilier, illustrated above, is one of a series of outstanding numbers in which is combined excellence in design, workmanship and performance; and embracing original construction features that are most practical in assembly and ease of installation.

Write for catalog J.

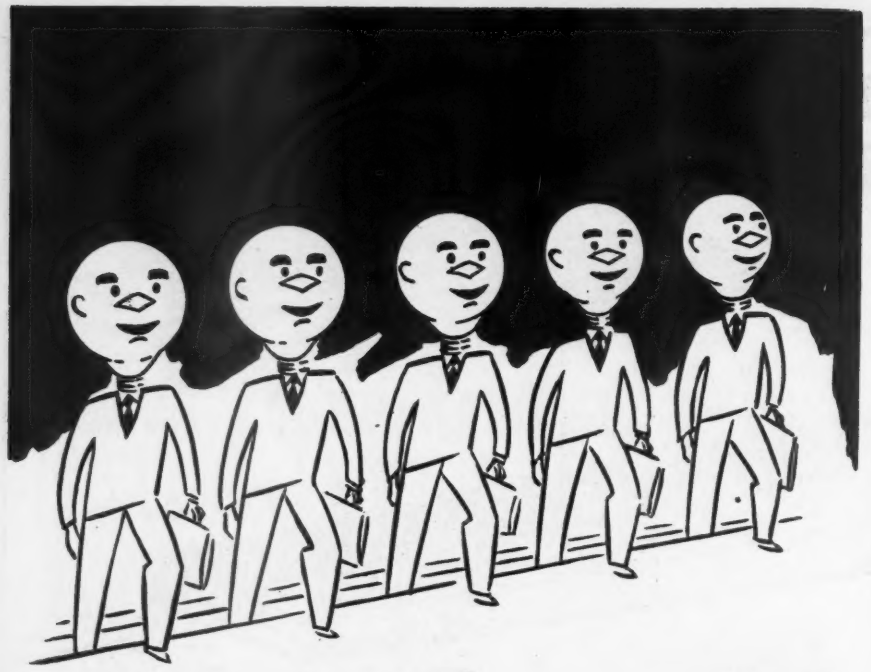
Distributed Through Wholesalers Only

ENGINEERED LIGHTING by MOBILITE INC.

MOBILITE Inc.,

440 MERCER ST., JERSEY CITY, N. J.

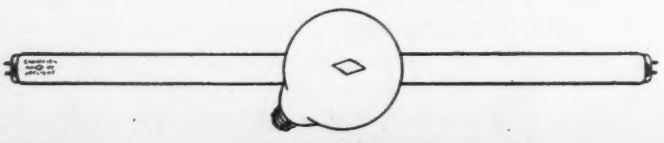
Manufacturers of Fluorescent Lighting.



NO CHARGE *For this* LIGHT *Brigade!*

Champion's lighting engineers do not sell their services or stand to profit by their recommendations for lighting improvement. Their extensive and varied experience on all industrial lighting problems is freely available to every user of Champion Fluorescent and *Incandescent* Lamps. They are in an unbiased position to help you secure better lighting and thereby increase your production efficiency, safety, working morale and lighting economy.

Whatever your needs, limited or extensive, you can enlist the services of this competent engineering counsel without cost or obligation. For details get in touch with your local Champion Lamp supply house.



CHAMPION LAMP WORKS

Lynn, Massachusetts

A DIVISION OF CONSOLIDATED ELECTRIC LAMP CO.

George Washington Chapter IAEI—Board Room, District Bldg., Washington, D. C., November 11.

Missouri-Kansas Chapter IAEI — Hotel Leon, Hutchinson, Kansas, November 12.

George Washington Chapter IAEI—Board Room, District Bldg., Washington, D. C., December 9.

American Institute of Electrical Engineers —Winter Convention, New York, N. Y., January 27-31, 1947.

Electrical Engineering Exposition—71st Regiment Armory, New York, N. Y., January 27-31.

International Heating and Ventilating Exposition — Lakeside Hall, Cleveland, Ohio, January 27-31.

Manufacturers News

ANACONDA APPOINTS C. H. PORTER MANAGER

C. H. Porter has been appointed manager of industrial, wholesaler and contractor sales of the Anaconda Wire & Cable Co., New York. He was for-

C. H. PORTER

merly eastern sales manager and prior to that district manager of the company's Cincinnati territory.

In his new capacity, Mr. Porter will supervise the sales and servicing of all products and endeavor to streamline and better coordinate relationship between customers, sales and production departments.

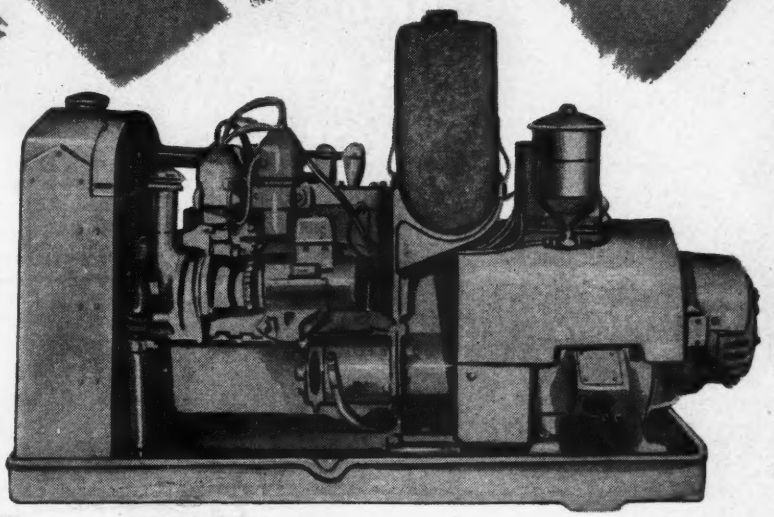
OKONITE APPOINTS NEW SALES MANAGER

R. S. Keefer has been named sales manager of the Okonite Company, Passaic, N. J. He succeeds Edward J. Garrigan, vice president in charge of sales, who died in July.

Mr. Keefer, formerly assistant sales manager of the company's Hazard Insulated Wire Works Division, started his career in the Hazard insulating mill at Wilkes-Barre, Pa. in 1922, later entering the sales department in which he has been active for the past 20 years.

PACKAGED POWER

PORTABLE DIESEL and GASOLINE ENGINE DRIVEN



GENERATOR SETS

Many Generator Sets, produced by well known manufacturers are now available from government-owned surplus. The majority of them are new, unused sets. Used sets in good condition are also available at reduced prices. The following types provide a rugged, dependable, economical source of electric power for:

Stand-by Units	**Summer Camps**
Small Machine Shops	**Trailer Camps**
Saw Mills	**Carnivals and Fairs**
Radio Stations	**Mobile Power Units**

Rural and Farm Installations

ALTERNATING CURRENT: 50 and 60 cycles; single and three phase; 120-480 volts; 1½ kva. and up; priced from $250 up.

DIRECT CURRENT: 24, 110 and 220 volts; ¼ to 40 KW; priced from $80 up.

The units are compact—versatile—built to endure. They are immediately available to your nearest War Assets Administration Regional Office. Write, wire or phone today.

All Portable Generator Sets are subject to priority regulations. VETERANS OF WORLD WAR II are invited to be certified at the War Assets Administration Certifying Office serving their area and then to purchase the equipment offered herein.

EXPORTERS:

The War Assets Administration solicits your inquiries. Communicate with your foreign clients promptly.

All items are subject to prior sale.

HOW TO PURCHASE:

1. If you can claim a priority, obtain your priority certificates at the nearest W.A.A. Certifying Office. Contact the W.A.A. office below for Certifying Office address and make application to purchase.

2. If you do not have priority status simply call any W.A.A. Office below; state the approximate KW rating you desire and the type of machine. You will be told where the machines you wish may be seen and how to complete purchase.

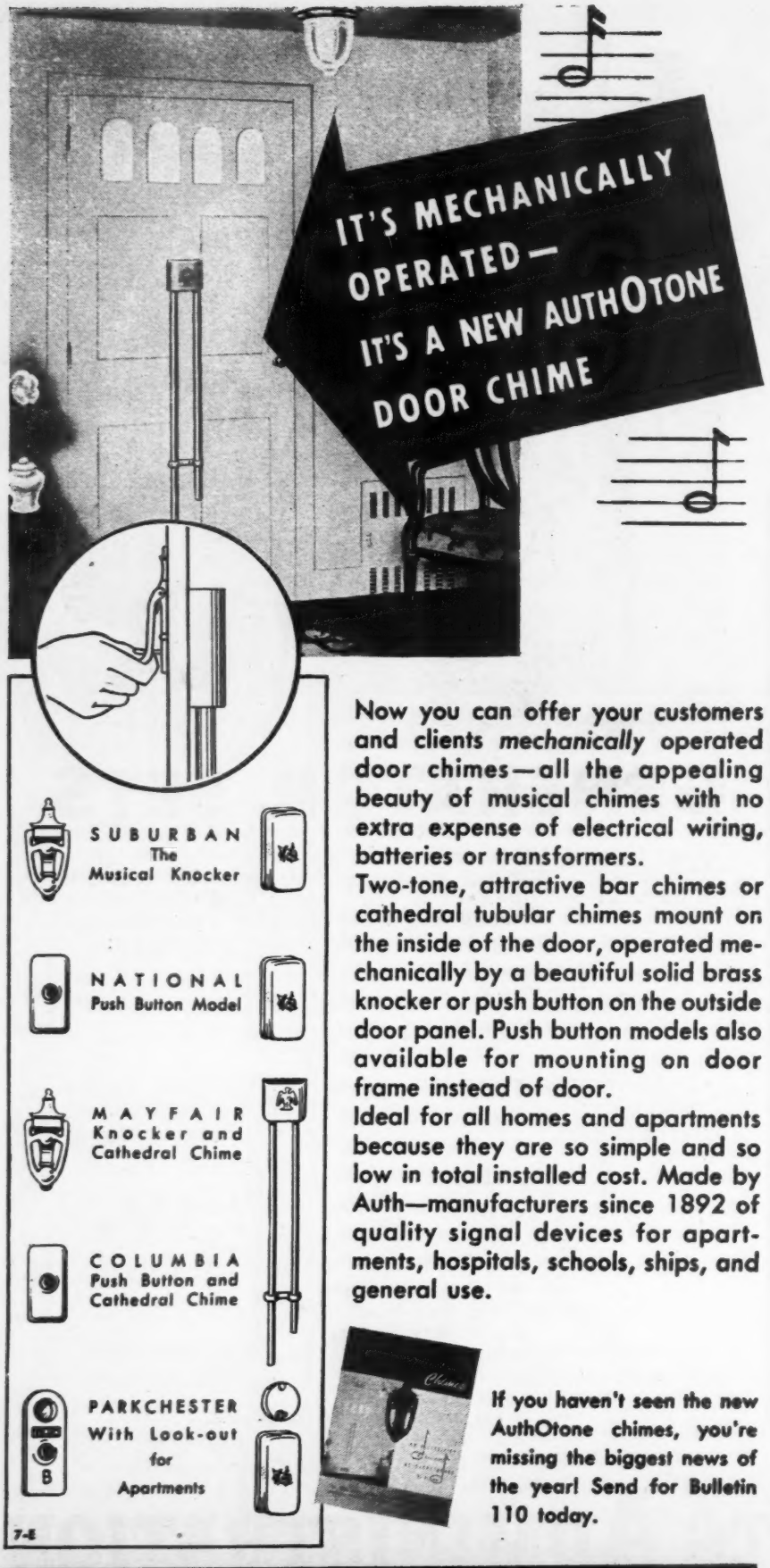
3. If the equipment you wish is not available in your local W.A.A. Regional Office—ask to have national inventories checked by the W.A.A. Inter-Regional Division of your local office and wait for notification of availability.

WAR ASSETS ADMINISTRATION

GOVERNMENT OWNED SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane

655-2



SUBURBAN
The Musical Knocker

NATIONAL
Push Button Model

MAYFAIR
Knocker and Cathedral Chime

COLUMBIA
Push Button and Cathedral Chime

PARKCHESTER
With Look-out for Apartments

7-E

Now you can offer your customers and clients *mechanically* operated door chimes—all the appealing beauty of musical chimes with no extra expense of electrical wiring, batteries or transformers.

Two-tone, attractive bar chimes or cathedral tubular chimes mount on the inside of the door, operated mechanically by a beautiful solid brass knocker or push button on the outside door panel. Push button models also available for mounting on door frame instead of door.

Ideal for all homes and apartments because they are so simple and so low in total installed cost. Made by Auth—manufacturers since 1892 of quality signal devices for apartments, hospitals, schools, ships, and general use.

If you haven't seen the new AuthOtone chimes, you're missing the biggest news of the year! Send for Bulletin 110 today.

AUTH ELECTRIC COMPANY, INC.
34-20 45th STREET LONG ISLAND CITY 1, N. Y.
Offices in AUTH Principal Cities
SINCE 1892

GENERAL ELECTRIC ANNOUNCEMENTS

A new branch of the G.E. electric welding division was recently opened in Houston, Texas. F. C. Neal, Jr. is manager of this branch and C. L. Helms is office manager.

The General Electric Company plastics division has started initial production in its new five million dollar factory at Coshocton, Ohio. The new plant is replacing present G-E facilities for manufacture of laminate materials at Lynn, Mass. It will consist of three buildings with the principal factory building comprising 235,820 square feet.

SYLVANIA CHANGES

John T. Burdick has been appointed California division manager of the lighting sales department of Sylvania Electric Products, Inc. His offices will be at 555 South Flower Street, Los Angeles.

The sales offices of the southeastern lighting divsion of Sylvania has been relocated at 1223 William Oliver Building, Atlanta, Ga.

The Washington sales office of the lighting division is now located in the Washington Building, 15th and New York Avenue, Washington, D. C.

BELDEN MANUFACTURING NAMES NEW REPRESENTATIVES

Chester J. Frey, of Chicago, has been appointed sales representative for the eastern sales district of the Buffalo, Syracuse and Pittsburgh areas of the Belden Manufacturing Company, Chicago.

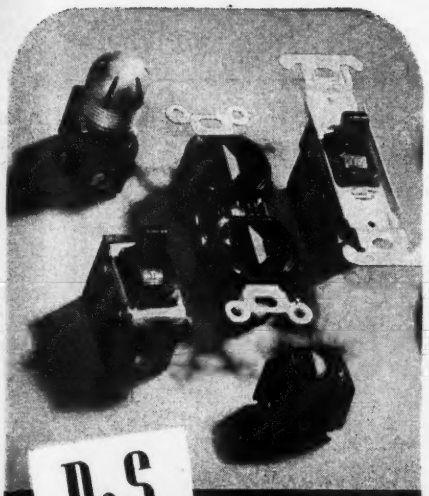
Alfred E. Kayworth has been named as sales representative for the New England states. He was formerly stationed at Belden's Chicago plant.

ILG APPOINTMENTS

J. J. Friedler, Jr., southern district manager of the Ilg Electric Ventilating Company has been elected to the board of directors.

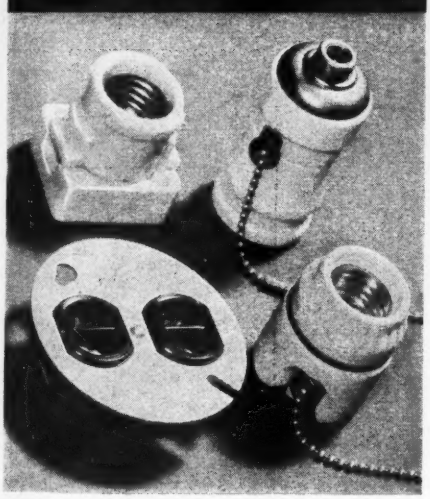
G. C. Jelliffe, formerly lieutenant commander in the U. S. Navy, has been appointed as direct assistant to P. D. Briggs, vice president and general sales manager. He will be located in the New York office.

Keith P. Ribble has been placed in charge of the Houston office. During the war he served with WPB, and prior to that represented Allis-Chalmers Mfg. Co. The Phoenix office is now being operated by E. B. Bomar, who has been a sales engineer in that area for several years.



P&S

FOR NEW WORK
FOR MODERNIZATION
FOR REPLACEMENTS



Whatever your Wiring Device requirements — you can't go wrong when you install P&S Outlets that hold caps firmly in place — Precision-built switches (with T-rating)—Sockets built for lifetime service.

Keep your P&S Catalog handy — and remember —

The Best Costs Less in the Long Run.

Sold through Electrical Wholesalers

PASS & SEYMOUR INC.
SYRACUSE 9, N. Y.

NEW LOW PRICE
$12.75 LIST
Telechron MOTORED

A low price switch with evening dimming feature. The new PS-30 is a worthy running mate for the Paragon PS, successfully used by thousands of poultry men. A precision-built, rugged, dependable switch. Authorities have proven that both morning and evening lighting greatly increases egg production per pound of feed.

This Is the Season to Cash In!

Large quantities of the new PS-30 and basic materials for additional quantities are now in Paragon stocks. Recent enlargements in plant . . . modernized manufacturing methods . . . and fortunate position as to availability of raw materials enable Paragon to make quick shipments . . . and to make savings in manufacturing costs reflected in the new low price. However, food shortages indicate huge demands for poultry switches to increase egg production. Help the Farmer lower his cost by getting more eggs per pound of feed. Be prepared to meet this demand. Order your poultry time switches now.

Paragon designs and manufactures time controls for every need.

PARAGON ELECTRIC COMPANY
1614 TWELFTH STREET
TWO RIVERS, WISCONSIN

"Mr. TOPS" Paragon Symbol of Top Quality

Paragon Two Rivers WISCONSIN
BUILDERS OF ELECTRICAL EQUIPMENT . . . SINCE 1905

YOU CAN SELL MORE INTER-MATIC TIME SWITCHES

$9.00* List

*115 V. 60 cycle, F.O.B. Chicago
50 cycle $9.19
25 cycle $9.32

Because

1. —its low price makes it attractive to many prospects
2. —its advanced design makes it easier to install and maintain
3. —its high quality assures long, trouble-free service
4. —it is suitable for most commercial, industrial, domestic and farm applications
5. —we furnish you with sales helps for local distribution.

Write for
Catalogue, Sales Helps and Names of Nearest Distributors

INTERNATIONAL REGISTER CO.

Dept. 106B, 2624 W. Washington Blvd., Chicago 12, Ill.

A. T. BERGERON NAMED SALES MANAGER

The Miller Company of Meriden, Conn. has announced the appointment of Albert T. Bergeron as sales manager of their illuminating division, to

A. T. BERGERON

fill the vacancy caused by the death of Arthur Miller, vice president in charge of sales. Mr. Bergeron's headquarters will be at the Meriden plant.

Mr. Bergeron has been with the Miller organization for 21 years and in 1937 he was made district sales manager covering the west coast territory, with headquarters in San Francisco.

ALLIS CHALMERS APPOINTMENTS

Richard F. Muller has been named manager of the New Orleans district office of the Allis-Chalmers Mfg. Co., succeeding F. W. Stevens, who continues with the company as a special representative in the New Orleans office.

R. W. Gillmore has been named manager of a new branch office opened in the Claremount Hotel Bldg., Evansville, Ind. He has been associated with the Indianapolis district office since October, 1935.

•

Weston Electrical Instrument Corporation at Newark, N. J. has started construction on a new three story engineering building, which will contain a gross floor area of 79,000 square feet. The building will be located on the present grounds of the Weston Company at 61 Frelinghuysen Avenue, Newark.

•

The Federal Electric Products Company of Newark, N. J. has purchased the Wurdack Company of St. Louis, manufacturers of electrical panelboards and switchboards.

The Cole Product Company of Long Island City, N. Y., long affiliated with Federal Electric, is being merged into

✲ SEALED
✲ SHOCK-PROOF

SAFE

No. 3007

THE NEW
McGILL
Vaporproof

Portable Lamp Guard . . . strong, portable, sealed. It is water-tight, vapor-tight, dust-tight and moisture proof. The plastic handle, and fibre cage are shock proof and non-sparking. **A rubber gasket has now been placed between the cage and handle, and absorbs all stress and strain, preventing breakage.** The heavy glass protecting globe eliminates possibility of breakage of the lamp bulb inside from splashing liquids. Being air-tight these guards are perfectly safe for use where vapor and dust infused air is prevalent. They have no equal for safety, service and convenience around flour mills, paint booths, finishing rooms, airports, warehouses, food processing plants, shipyards, aboard ships, and many other places.

The No. 3007 has the plastic cage. The No. 3006 has a heavily tinned, electrically welded wire cage.

ELECTRICAL DIVISION

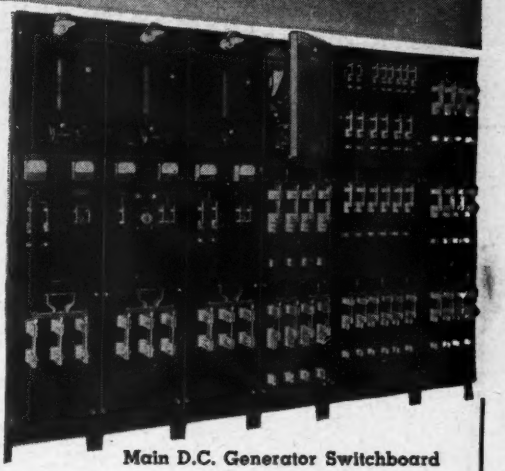
McGILL
MANUFACTURING CO., INC.
VALPARAISO, INDIANA

Whether your needs are

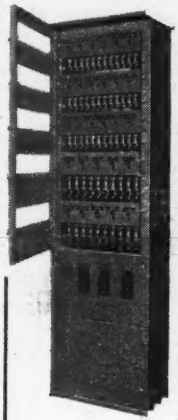
STANDARD

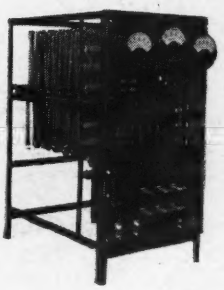
or

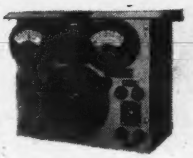
SPECIAL



Main D.C. Generator Switchboard







Left-to right: Power Panel, Hospital Clinical Equipment. Loading Rheostat Panel. "Asdic" Underwater Sound Panel.

you can depend on exceptional help from

Pelham

Standardized units are recommended when they fit your requirements in every detail. Certain types of switchboards and panels enable us to give you the economies of quantity production.

Special design, to meet your needs exactly, is provided for major units—or any unusual equipment. The wide experience of our engineering staff will prove most helpful.

Highest quality materials—best of workmanship—and deliveries when promised.

PELHAM ELECTRIC MANUFACTURING CORP., ERIE, PA.

SPECIALIZED DESIGN
Pelham
UNEXCELLED QUALITY

SWITCHBOARDS • PANEL BOARDS • SWITCH GEAR AND ACCESSORIES

3 LABELS TO LOOK FOR
ON
FLUORESCENT LAMP BALLASTS

When a label is familiar to a buyer, it is usually because the organization so identified is long-established in its particular field.

Chicago Transformer ballasts can boast of three such labels—the C.T.C. emblem, a trademark of manufacturing experience, plus the U.L. and E.T.L. insignias, trademarks of two recognized testing laboratories.

C. T. C.—*Manufactured by Chicago Transformer.*
U. L. —*Approved by Underwriters Laboratories.*
E. T. L.—*Certified by Electrical Testing Laboratories.*

. . . Three labels to look for on fluorescent lamp ballasts, because ballasts bearing them win confidence for the lighting equipment in which they are installed.

CHICAGO TRANSFORMER
DIVISION OF ESSEX WIRE CORPORATION
3501 ADDISON STREET · CHICAGO, 18

the Federal Electric Products Company.

The Wurdack line of products will be expanded to include many items manufactured by Federal in the East. Plant space in St. Louis will be doubled and considerable new equipment added.

•

The appointment of Edward R. Yonkers to the position of Wolverine District Manager for the **Graybar Electric Company** has been announced. He will make his office in Detroit and will head up Graybar activities in the Flint and Lansing areas as well as Detroit.

•

National Electric Products Corporation, Pittsburgh, Pa., recently completed a new addition to its rigid conduit department building at the Ambridge, Pa. plant.

•

Noma Electric Corporation has elected four new directors. They are Dr. Boris Emmet, former national retail merchandise manager for Sears, Roebuck & Co., and special merchandising advisor to Henri Sadacca; David E. Kahn, former president of Estate Stove Company; Leo L. Pollak and Carl Schlesinger, former president and vice president respectively of Pollak Manufacturing Company.

•

Robert S. Sloan has been appointed district appliance manager of the **Westinghouse Electric Supply Company's** northern California district. He will be located at district headquarters in San Francisco.

•

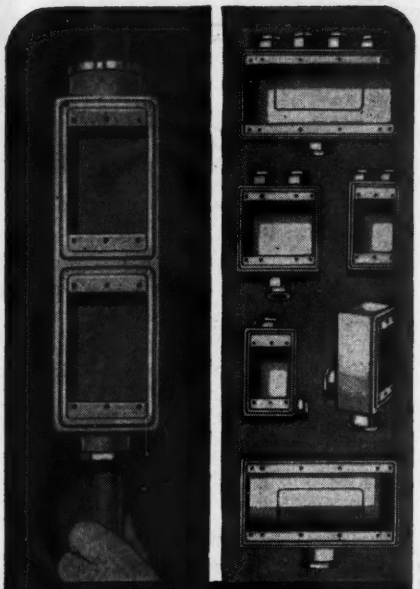
Solar Capacitor Sales Corp. has announced the appointment of Bruce Cumming as Chicago area district manager. Mr. Cumming's offices are at 228 North LaSalle Street, Chicago.

•

Hutson Colcock has resumed his duties as field representative for **Curtis Lighting, Inc.** in the New Orleans territory after five years in the Navy.

•

The Montgomery Mfg. Company, formerly Montgomery Time Systems, has opened a national sales office at 549 West Washington Boulevard, Chicago, Ill. Commander Ralph T. Brengle is in charge of the Chicago office and all Montgomery sales activities will be carried on by this organization.



A full line of FS Fittings *with these Advantages:*

You can use Thin-Wall Tubing at ANY outlet of ANY Kondu fitting. Just slip out one bushing and slip in another—no extra pieces are needed.

Change boxes without disturbing conduit—at any time. Or you can install a conduit line before the fittings are delivered. Every Kondu box is a union.

Vibration-proof—holds tight permanently. Practically unbreakable . . . 100% re-usable.

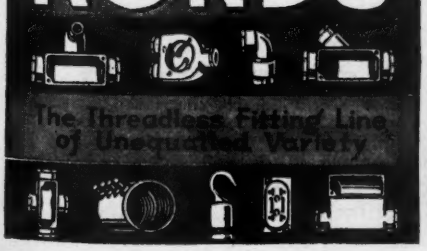
A full line—many hundreds of types.

Write for the Kondu Catalog

KONDU CORPORATION
Erie, Pa.

KONDU MFG. CO. LTD., Preston, Ontario

KONDU



QUAD

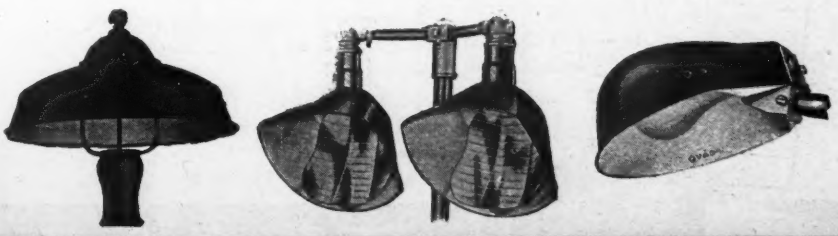
LIGHTING UNITS FOR SERVICE STATION

Modernization

★ Correct distribution of lighting equipment gives an attractive appearance to service stations. QUAD has a most complete line of lighting units for this need—a few of which are shown. We have the correct unit for the pump island . . . floodlights for area lighting . . . angle reflectors for the signs . . . in fact any unit your customers want, we can supply.

★ You don't have to be told that service stations all over the country are ready for modernization . . . therefore, we urge you to sell QUAD Lighting Units and get your share of this business.

OUR CATALOG IS COMPLETE WITH DESCRIPTIONS, ILLUSTRATIONS, ETC. ON OUR WHOLE LINE— SEND FOR YOUR COPY



QUADRANGLE MFG. CO.

32 S. PEORIA ST. CHICAGO 7, ILL.

NOW in New Plastic Protective Case!

POWER CUTTER KIT

with a cutting range of 5/8" to 2 1/2"

Only $7.85 Complete

Two Bruno Adjustable Hole Cutters in one convenient, permanent case that keeps tools clean and blades sharp. High speed steel blade cuts clean, fast holes in metal, plastics, wood. Quickly adjustable and easily sharpened... Designed by tool engineers to operate efficiently in bench drill, drill press, or portable drill.

Ask your jobber, or write Dept. EC-10

POWER CUTTER KIT CONTAINS

MODEL	SHANK SIZE	EXPANSION	PRICE
100	1/4" st. shank	5/8"—1 1/2"	$3.00
101	3/8" st. shank	1"—2 1/2"	$5.00
790 KIT		5/8"—2 1/2"	$8.00*

*Fair Trade Minimum $7.85

BRUNO TOOLS

9330 Santa Monica Blvd.
Beverly Hills, Calif.

DETROIT'S REORGANIZED INSPECTION

[FROM PAGE 72]

bility in determining "degree of hazard" and type of electrical installations in explosive atmospheres, as required under the '46 Code. When confronted with such a situation the inspector requests, through his supervisor, an expert opinion of the Fire Bureau which has final jurisdiction over flammable liquids, explosives, gases and vapors.

The bureau assigns a chemical engineering inspector to investigate the premises with the electrical inspector. After tests are made, the "degree of hazard" is determined and a classification, in accordance with the National Electrical Code, assigned to the area.

Once the classification is assigned, the inspector's course is clear in specifying the correct type of wiring and seeing that it is properly installed. Favorable progress has been reported on such establishments as dry cleaning plants, gasoline handling equipment, paint spray booths, paint manufacturing plants, and others where metal or fibre dust is prevalent. The wholehearted support of the Fire Department, is indicative of what cooperation between various city departments can accomplish.

Reinspection Procedure

Reinspection is a continuous phase of department operation. Active lists are compiled from Fire Department referrals, Board of Health complaints, owner's requests and tenant complaints. This past summer practically every gasoline pump in the entire city was reinspected and violations or faulty conditions corrected.

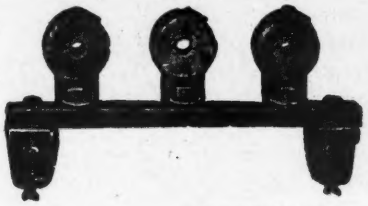
When additional men of the right caliber can be secured, the department plans a systematic reinspection of all industrial plants. At present, spot checks are made on all major industrials and the cooperation of most plant engineering departments in filing permits for work has been encouraging, Mr. Herndon reports.

Yearly reinspections are made of all hotels, theaters, dance halls, cabarets, and places of public assembly. Such surveys include electrical, plumbing for sanitation, and building for structural conditions. All must be approved by the various departments before the establishment's operating license is renewed by the Police Department.

One of Mr. Herndon's major objectives is better industry cooperation. He is a firm believer in the theory

NEW!

Non-Inductive Conductor Racks



Racks available for any number of cables — cable sizes 5/16" to 2⅜".

● Available in types for any number of cables, the M & W Type S-L Conductor Rack is designed so that cables are only partially surrounded by metal. This prevents induced current—permits the rack to be used for A.C. or D.C. systems. Simple design makes for quick, easy mounting of cables.

Write today for Bulletin C-5-51 . . . contains full information on M. & W. Non-inductive Cable and Conductor Racks.

M. & W.
ELECTRIC MFG. CO.
EAST PALESTINE OHIO

Bend Conduit Cold-

Here's How

Conduit can be bent

40°
to any desired angle

60°
without moving pipe

90°
in one operation

Installation work goes faster, easier, and at a lower cost when you have a Tal's Prestal Bender on the job. This efficient, light, portable machine handles all pipe and conduit up to 3". Makes perfect bends, up to 90°, cold, in one single operation. No need to waste labor by replacing the pipe three to six times to make a bend. Does a good workmanlike job — smooth, uniform bends without kinks or wrinkles. Simple and easy to operate. Thousands are in successful use everywhere. Write for data bulletin.

Tal's Prestal Bender, Inc.
Dept. EC-10, Milwaukee 2, Wisconsin

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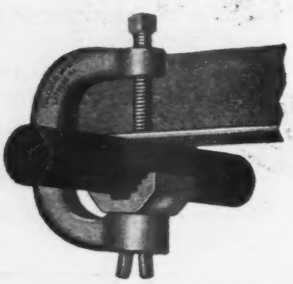
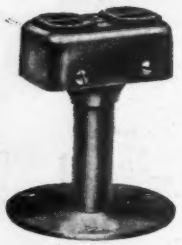


No. 470 "Latrobe" Pipe or Conduit Hanger

A convenient, sure grip device specially designed for hanging ½", ¾" and 1" pipe or conduit to steel beams up to ⅜" thick.



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Here is a Duplex Receptacle Nozzle with Brass pipe extension for quick installation and long dependable service. Furnished with ½" or ¾" pipe extension.

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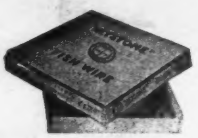

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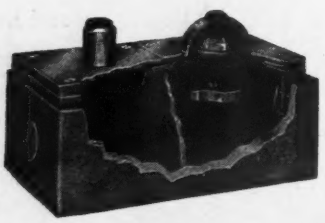

No. 252-R Floor Box

Two gang type with No. 208 Receptacle in one section and ½" Brass Plug in one cover plate and 2" Brass Plug in the other.

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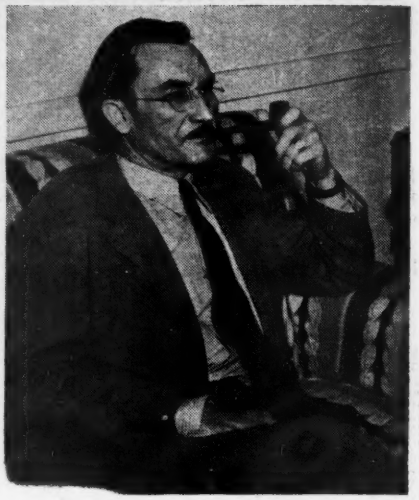

New chief electrical inspector of the City of Detroit, Elmer E. Herndon.

that an electrical inspection department should be tied in closely with every branch of the industry. Then the inspectors may learn at first hand industry's various problems and gripes; may disclose their own problems, aims and ambitions; may develop cooperative educational programs. When the head of the inspection department cannot be present, he assigns one of his assistants to attend all contractor and engineering meetings.

Better control over inspection of electric fixtures, particularly the gaseous tube type, is another department objective. All units carrying Underwriters' labels are accepted without dismantling the fixture. On fixtures not bearing such labels, manufacturers and distributors must submit complete drawings and specifications for department study. Temporary approval, identified by a sticker numbered and signed by the Bureau, is issued and filed on all such units that merit approval.

Publication of a regular quarterly information bulletin is also contemplated. This will contain code interpretations, new regulations and other data designed to better coordinate the work between the inspector and the industry at large. At present, electrical inspection is sold the industrial engineer on the basis of the services the Bureau can offer, suggestions on wiring methods, materials, circuit and equipment protection, safety measures, all of which more than offset the fees incurred. Electrical inspection and installation by licensed men is promoted among plant electricians on the basis of strengthening their position in the event of an electrical system failure.

Mr. Herndon has, what he now believes to be, an ideal organization to handle Detroit's inspection needs.

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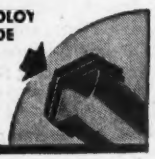

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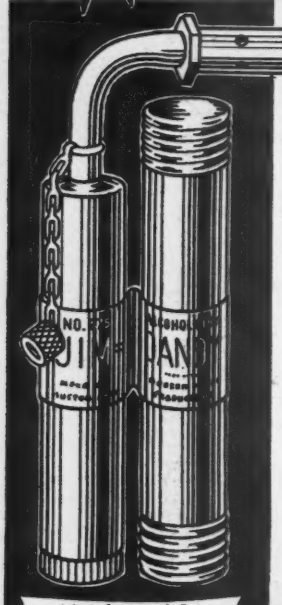
With 4 inch FLAME



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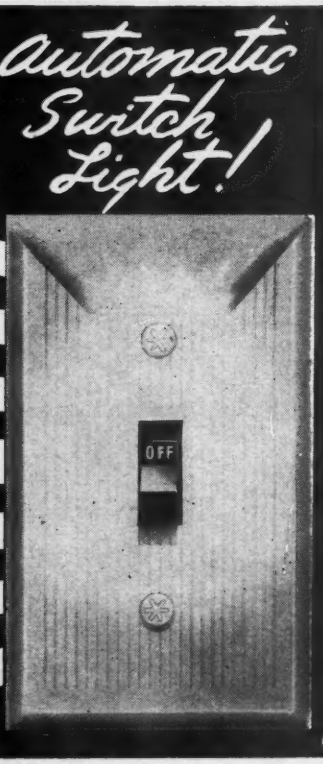

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[FROM PAGE 713]

salvage value of the bus system became strikingly evident during these operations.

In addition to the electrial demands attributed directly to the U. N., the total connected load included sewage, condensate and circulating pumps, air conditioning filters and fans, unit heaters and other equipment installed for the operation of the original plant. Rerouting feeders to this equipment altered the initial loading of many of the busses and new feeders had to be installed between transformer stations and busses in accordance with the revised system. In several cases increased feeder capacity required larger circuit breakers and existing breakers were rewired with new coils and recalibrated.

From many angles, the electrical revamping phase of the work required more fundamental engineering skill than would have been demanded in a new installation. The job was primarily one of major re-design, revision, reusing existing equipment selected for other purposes, and checking loading conditions.

Electrical contractor B. Eichwald of New York City was selected to engineer and effect this multiple revamping job, maintain the system upon completion of the alterations, install the entire audio system (wiring, pick-up, control and distribution for amplification, radio broadcast and recording of all speeches and translations) and augment the existent lighting plan. Structural alterations and layouts were by architects Voorhees, Walker, Foley and Smith. All construction was by general contractor Robert Glenn.

Bartlett Electric Company, Tulsa, Oklahoma, specializes in electrical construction and motor repairs. Supt. Raymond Clark (left) is responsible for the shop operation while L. A. Bartlett (right), owner and manager, handles the construction end.

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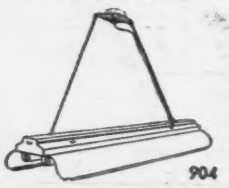
*Patent No. D-141024. Others pending. Underwriters approved.



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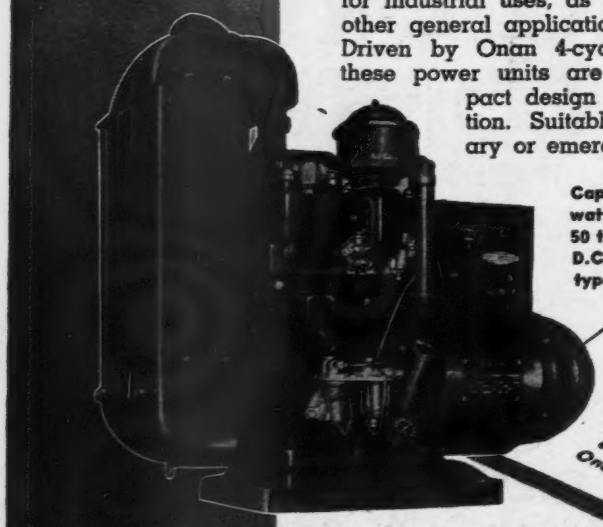

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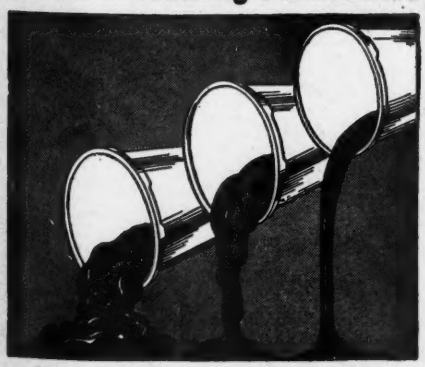

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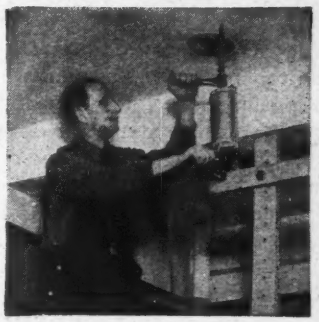

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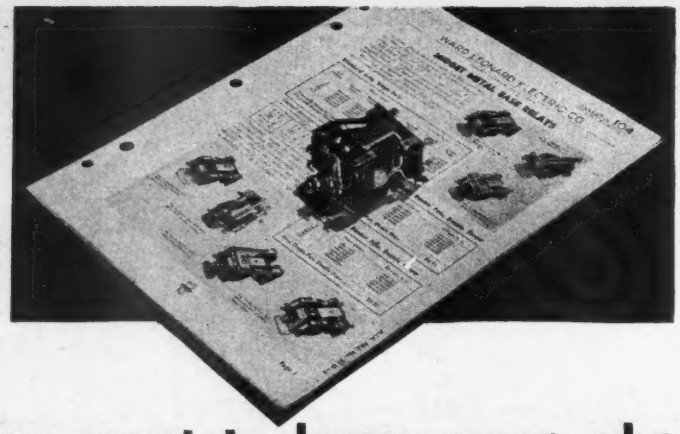

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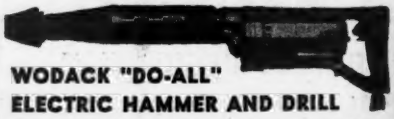

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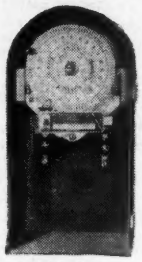
TORK CLOCKS



For all types of electrical switching and time control, Tork Time Clocks will control operations efficiently and automatically. Self-starting, all-electric. A variety of models; for minutes, hours, days, or weeks. Plain or Astronomic Dials.

Price from $13.00 list. *Write for Bulletins*

OTHER TORK PRODUCTS

TORK 'PERSONAL': Portable plug-in switch for home or office. Capacity 660 Watts. All standard features.
TORK TYMOTHERM: For automatic and efficient heating control; 'steady,' 'intermittent,' and 'off' control. For oil, coal, or gas.
WEEKLY CALENDAR WHEEL: Optional feature on all standard models provides for automatically skipping one or more days each week.
POULTRY LIGHTING CLOCKS: Standard models for automatic Bright-Dim lighting equipment control for poultry houses.

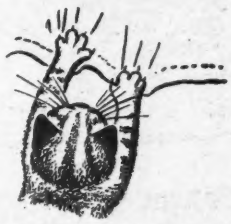
RELAYS AND CONTACTORS * SPRING-DRIVEN MODELS * CAM OPERATED TIMERS * CLOCKS FOR SPORTS AND GAMES * SELECTOR WHEELS * TIME DELAY CIRCUITS * FREEZALARM FOR REFRIGERATION PROTECTION

TORK CLOCK CO.
MOUNT VERNON NEW YORK

IT'S FRESH AS A DAISY...

CELLOPHANE-SEALED — then individually boxed—every roll of Jenkins Gold Seal Friction Tape is bound to reach you factory-fresh!

WON'T RAVEL OR PEEL...



IT WON'T smudge hands either... and it won't dry out on the shelf or job, thanks to quality control of fibre and friction compound.

IT STICKS LIKE A LEECH . . .

HOT weather or cold, Gold Seal Friction Tape always has the right amount of Tack ... always sticks to the job — but never to the hands!

. . IT'S JENKINS GOLD SEAL!

MADE BY the makers of Jenkins Diamond Seal Friction and Rubber Tapes — both of which meet ASTM and Federal specifications.

JENKINS *Gold Seal Tapes*

Jenkins Bros., Rubber Div., 80 White St., New York 13, N. Y.

FRICTION . . . RUBBER

GEDNEY

GEDNEY FITTINGS...FIT!

FITTINGS

Conduit Bodies and Fittings by GEDNEY, are available for every requirement. All-inclusive, this quality line features both threaded and threadless types. Underwriters Laboratories approved and distributed through recognized wholesalers exclusively. Write for catalog.

GEDNEY ELECTRIC COMPANY
230 BLDG., RADIO CITY, NEW YORK N. Y.

TOUGH!

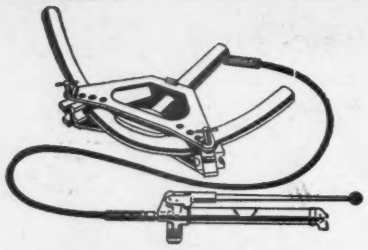
NO. 63310

For a Weatherproof Socket that will stand up under the worst conditions use this socket. A trial order will convince you that it the best ever made.

CANVAS IMPREGNATED
IMPACT RESISTING
BAKELITE
WEATHERPROOF
SOCKET NO. 63310
LONGER LIFE
LESS REPLACEMENTS

Ask Your Jobber

UNION INSULATING CO., INC.
PARKERSBURG, W. VA.



When you buy a

BENDER

..check to make sure you get these features:

EASY TO GET TO THE JOB

☑ Lightweight, portable—one man can easily take a Blackhawk Pipe Bender right to the job. Bends rigid conduit and pipe in all popular sizes, up to 4" dia.

WORKS AT ALL ANGLES

☑ The compact hydraulic Porto-Power Ram is all-directional. Power eliminates need for heating the pipe.

WORK OVERHEAD

☑ All-directional operation and light weight enlarges range of utility to use on ladders, scaffolds and cramped quarters and work on existing pipe runs.

SIGHT FROM ANY ANGLE

☑ Remote control permits operator to stand in any position for a full view of the job. Saves need for elbows, couplings, cutting and extra threading.

DETACHABLE POWER UNIT FOR EXTRA UTILITY

☑ It pulls gears, lifts machinery, and licks scores of other trouble jobs.

BLACKHAWK Porto-Power PIPE BENDERS

BLACKHAWK MFG. CO.
Dept. P 20106, Milwaukee 1, Wis.
Mail Hydraulic Equipment catalog to:

NAME _____

COMPANY _____

ADDRESS _____

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT : BUSINESS : "OPPORTUNITIES" : EQUIPMENT : USED OR RESALE

UNDISPLAYED ——RATES—— DISPLAYED

(Not available for equipment advertising)
15 CENTS A WORD. MINIMUM CHARGE $3.00.
Positions Wanted (full or part time individual salaried employment only), ½ the above rates payable in advance.
Box Numbers—Care of publication New York, Chicago or San Francisco offices count as 10 words.
Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Individual Spaces with border rules for prominent display of advertisements.

The advertising rate is $8.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞" vertically on one column, 3 columns—30 inches—to a page.
E.C.

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Electrical manufacturer of nationally known motor control and power distribution equipment is interviewing candidates for a student engineering course directed toward headquarters application and field engineering work of permanent nature and with excellent opportunity for advancement.

Men selected must have engineering degree, sales aptitude, intelligence, initiative and be within 21-30 year age bracket. Give full particulars. ADDRESS

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520 North Michigan Ave., Chicago 11, Ill.

Electrical Motors & Controls

ENCYLOPEDIA

Complete, practical encyclopedia of reliable information on Electrical Motors and Controls. Understandably written. It contains nearly every type of connecting diagram for Fractional horsepower, 2 Phase, 3 Phase, and Direct Current Motors. All Standard circuits, as well as New Special Types of Variable speed, Multi-speed, Dual-Voltage and Capacitor Motors included. Hundreds of tables you need in your work. Practical methods of rewinding, reconnecting motors for speed, voltage, phase, frequency. 1947 Edition of 1000 ELECTRIC MOTOR DIAGRAMS & TABLES now available at $7.25. Satisfaction or full remittance refunded. Free literature.

EDUCATIONAL ADVANCEMENT COMPANY
Dept. EC Lakewood, New York

Motors Motor-Generators

1—1500 H.P.
BOUGHT-SOLD
NEW and REBUILT
ELECTRIC EQUIPMENT CO.
Rochester 1, N.Y.

Engine-Generators Transformers

POSITION VACANT

EXPERIENCED ELECTRICAL estimator and engineer wanted by a leading electrical contractor in southeast. Excellent opportunity for man with suitable background in industrial electrification, preferably in textile field. Applicants state age, education, experience, references, and salary. P-381, Electrical Contracting, 330 W. 42nd St., New York 18, N. Y.

POSITION WANTED

ELECTRICAL ENGINEER for Technical Service in research, development or test, part or full time. Qualified to supervise and expedite technical projects, laboratory—field. Quality control analysis or instrument application. Laboratory facilities available in New York. PW-380, Electrical Contracting, 330 W. 42nd St., New York 18, N. Y.

Industrial Electrical Engineers

For design work in chemical plant. Technical graduates with minimum of two years experience in layout and design of industrial power generation, distribution, application, control, conversion. Permanent position with large chemical company in the Southwest. Salary commensurate with ability and experience. Give complete details of past experience, education, etc. Application by letter or conference.

Personnel Director

THE DOW CHEMICAL COMPANY
Freeport, Texas

Your Inquiries to Advertisers Will Have Special Value . . .

—for you—the advertiser—and the publisher, if you mention this publication. Advertisers value highly this evidence of the publication you read. Satisfied advertisers enable the publisher to secure more advertisers and—more advertisers mean more information on more products or better service—more value—to YOU.

Surplus Electrical Fittings

ALL TYPES FOR IMMEDIATE SALE

at

LOW COST

Electrical fittings of every description are now available to industry, electrical contractors, wholesalers and dealers. Hundreds of items of standard and special equipment are included in this surplus inventory — in many instances the special items are readily adaptable to other uses or needs.

All fittings and equipment are being sold at bargain prices representing a very real saving to purchaser. Prompt delivery is assured.

A partial list of available electrical fittings and equipment is given here:

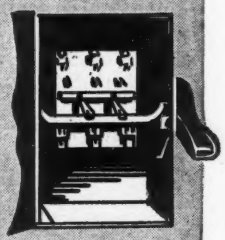
- Condulets
- Switches
- Panelboards
- Connectors
- Special Electrical Motors
- Wiring Devices
- Power Conversion Equipment
- Sub-station Equipment
- Protective Equipment
- Pole-line Hardware
- Plastic Insulating Sheets
- Hundreds of Other Items

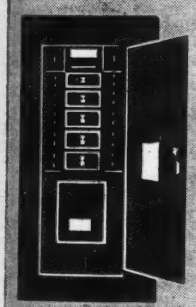
WEATHER RESISTANT CONDULETS

For electrical installations exposed to weather, moisture, steam or combustible dust.

SAFETY SWITCHES

Single and Multiple switches. All ratings and types.



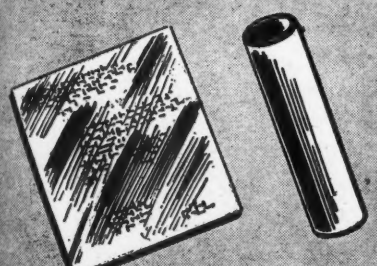


PANEL BOARDS

For lighting and appliance circuits. All electrical services and voltages.

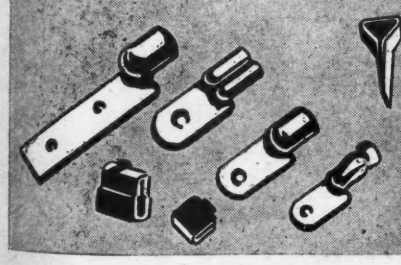
PLASTIC INSULATING SHEETS

Laminated plastic sheets and tubes for electrical uses.



CONNECTORS

Both solder and solderless types.



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Name.....

Firm.....

Address.....

City..... State.....

All Electrical Fittings and Equipment are subject to priority regulations. VETERANS OF WORLD WAR II are invited to be certified at the War Assets Administration Certifying Office serving their area and then to purchase the material offered herein.

EXPORTERS:
Most surplus property is available to the export market. Merchandise in short supply is withheld from export, and if such items appear in this advertisement they will be so identified by an asterisk.

WAR ASSETS ADMINISTRATION

GOVERNMENT OWNED SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane

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★ These companies have supplied additional buying information on their products in the 1946 edition of the Electrical Buyers' Reference

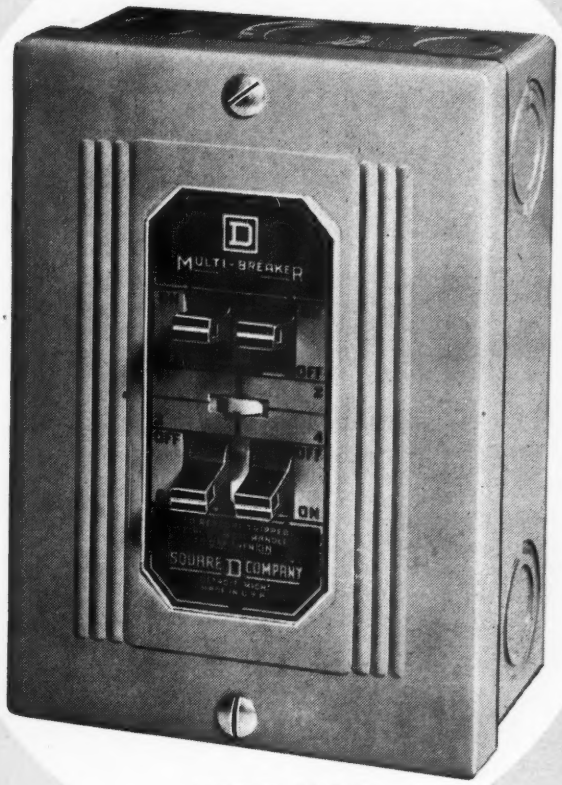
Announcing

A NEW 4-POLE THERMAL MAGNETIC TRIP MULTI-BREAKER

Trips instantly on short circuits but holds on harmless overloads

The popular MO 2-pole Multi-breaker now increased to 4-pole range

Calibrated for the new National Electrical Code, wire ratings 15, 20, 30 ampere



TYPE MO4

AVAILABLE NOVEMBER 1, 1946

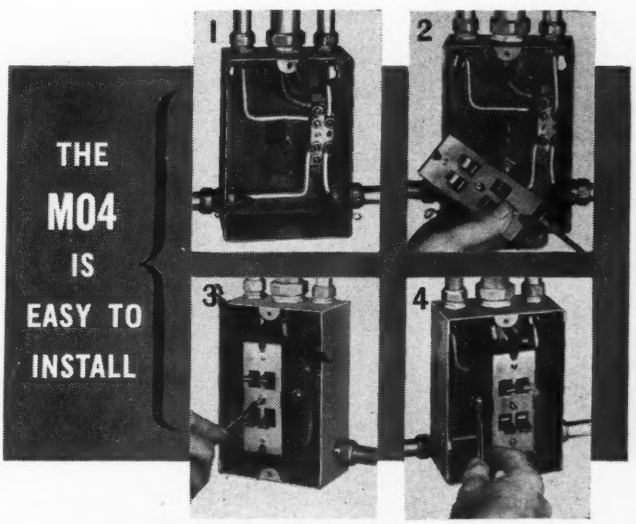
2-WAY PROTECTION FOR CIRCUIT WIRING

The magnetic trip functions in 1/50 to 1/100 of a second even on minor short circuits. This magnetic trip feature is combined with the time-tested thermal bi-metal element which provides time-delayed tripping on moderate overloads.

The MO4 MULTI-BREAKER is compact (5"x7") having 4 single poles with circuit ratings of 15, 20, 30 amperes. Either top or bottom poles can be converted into a double pole circuit by inserting a handle tie bar furnished with the device.

MO4 MULTI-BREAKERS are available for flush or surface mounting.

Ideal to install in GI homes, farms, prefabs where two lighting or appliance circuits and a small electric range circuit are required. Or in homes, farms, shops, stores, etc., where four lighting or appliance branch circuits are needed.



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SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

General Electric conduit is carefully selected from the best steel pipe—a pipe that will not open when bent. Two types are available—each specially coated for specific kinds of corrosion.

G-E White Conduit has a hot-dipped zinc coating that gives lasting protection against heat, cold, sunlight, condensation, rain and sleet—against all types of atmospheric corrosion.

G-E Black Conduit has a baked-enamel coating that gives lasting protection against acids, liquids, fumes, and oil—against all types of chemical corrosion.

Choose General Electric conduit where you require the best possible protection for wiring. Exhaustive factory tests assure you that G.E.'s rigid conduit will withstand the most rigorous conditions.

For further information, see the nearest G-E Merchandise Distributor or write to Section CI-108, Appliance and Merchandise Department, General Electric Company, Bridgeport, Conn.

GENERAL ELECTRIC

NOV